THE IRON AGE

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The Liberty Bell and Disease of Metals

How Remelting the Iron Years Ago, Using Unscientific Methods and Mixtures Injured the Relic—Its Removal to the Panama Fair Blocked

The Liberty Bell is suffering from the disease of metals. This has been clearly brought to the attention of the public by the recent strenuous agitation to obtain permission for its removal to the Panama-Pacific International Exposition at San Francisco. The fact that the bell has been transported several times to various expositions has lent courage to the agitators.

Opponents of its removal from Independence Hall, Philadelphia, contend that if the bell is to be preserved intact as a sacred relic, it is absolutely necessary that it should be safeguarded as far as possible from all vibration; that it has already suffered irreparable injury from previous journeys to New Orleans in 1885, to Chicago in 1893, to Atlanta in 1895, to Charleston in 1902, to Boston in 1903 and to St. Louis in 1904.

In 1909 when the city council of Philadelphia seemed determined to send the bell to Seattle, Wash., those opposed sought expert metallurgical advice, for it had been observed that, in addition to the old vertical crack, a new crack had developed in comparatively recent years, starting from the top of the old crack extending diagonally around the upper portion of the bell, more than a quarter of its circumference. At first this new crack could only be seen by the aid of a magnifying glass, but it is now plainly visible to the naked eye, as indicated by the dotted line in the illustration. The curator of the museum where the bell rests applied to the Franklin Institute for an expert opinion as to the new crack and he was referred to Alexander E. Outerbridge, Jr., of Philadelphia, a metallurgist of distinction, who holds the chair of metallurgy in that institute, an honorary one created when Mr. Outerbridge was given the institute's Elliott Cresson gold medal in 1904 for "investigations and discoveries in the molecular physics of iron." The result of Mr. Outerbridge's investigation then was that the bell was kept at home. His recommendation, that it be supported on four padded stilts to relieve the strain which was gradually pulling the bell apart while hanging from the yoke, was adopted with beneficial results and to the satisfaction of many.

The Liberty Bell Showing the Old Original Crack with the Dotted Line Indicating the New One Which Has Developed Recently

Vigorous protests were voiced early in February when it became known that various Philadelphia councilmen were planning to introduce into the municipal legislative bodies a bill to send the bell to the Panama Exposition. As in former trips this excursion, it was contended, would again afford a delightful trip of a few officials to the fair at the expense of the city. Through the efforts of the Daughters of the American Revolution, Mr. Outerbridge was again brought into the contest, and he submitted an expert opinion on the present condition of the bell and against its removal. Extracts

from this interesting report are as follows:

It is no hyperbolical figure of speech to say that the venerated Liberty Bell is afflicted with a serious disease. Metallurgists have adopted into their technical phraseology the term "diseases of metals," and recognize several such maladies. I, myself, have no hesitation in saying that the bell has a distemper which should insure its most careful preservation from all shocks such as it would be subjected to in a long journey. It is only necessary to take a brief glance at the history of the bell to understand the cause of this malady.

THE FIRST CASTING OF THE BELL

The bell was first cast in London by one Thomas Lester on the order of three eminent men, Isaac Norris, Thomas Leech and Edward Warner, then superintendents of the State House. It arrived in Philadelphia in 1752, and was tested in August of that year. Mr. Norris states: "It was cracked by the stroke of the clapper without any other violence, as it was hung up to try the sound. . . . When we broke up the metal our judges here generally agreed it was too high and brittle. We concluded to send it back by Captain Budden, but he could not take it on board, upon which two ingenious workmen undertook to cast it here, and I am just now informed they have this day opened the mold and have got a good bell, which, I confess, pleases me very much." Mr. Norris further states that in order to toughen the alloy, which was evidently too brittle, about 10 per cent. of copper was added to the metal of the original bell when re-melting it. In a subsequent letter to the colonial agent in London, Mr. Norris wrote: "After it was hung in its place it was found to contain too much copper, and Pass & Stow, the workmen, were so teased with the witticisms of the town that they asked permission to cast it over again." Mr. Lester also offered to make another bell, taking back the metal of the defective one in part payment, but it was decided to give Pass & Stow, who, by the way, are said not to have been bell-founders by trade at all, another chance.

They re-cast the bell, adding, without doubt, a quantity of tin to restore the tone which the excess of copper had entirely destroyed. The third bell proved to have a high sonorous quality, and Pass & Stow were then paid £60 13s. 5d. ($295.25) for their labor. It is probable that the effort made to increase the resonance was overdone, for bitter complaints against the loud and harsh clamor were made to the Assembly. One petition, signed by "divers inhabitants," complains that they were much distressed by frequent ringing of the great bell, "and beg to be relieved from this dangerous inconvenience, except at the time of the meeting of the Honorable Assembly and of the Courts of Justice."

THE CRUDE METHODS OF MELTING

We have no record of the final composition of metals employed by Pass & Stow, but we do know that they must have used at least two dozen of the largest crucibles or melting-pots then known, in order to melt more than 2000 pounds of metal required. Under these circumstances, the casting cannot possibly have been of homogeneous composition, and the bell was, therefore, subject to abnormal shrinkage and cooling strains, which actually caused a great crack to occur at a time when the clapper was muffled in tolling a solemn dirge on the occasion of the funeral solemnities of the first Chief Justice of the Supreme Court of the United States, John Marshall.

Had the bell been allowed to remain at rest after the disease had thus shown itself in a great crack extending about two-thirds of the distance from the lip to the top (being arrested by the somewhat thicker metal of the word "Philadelphia"), the new and more dangerous crack extending diagonally around the bell from the letter "P" in Philadelphia to beyond the letter "Y" in "Liberty," would probably not have occurred, for it was never observed until after the bell had made a number of peripatetic trips around the country, escorted by city fathers and policemen.

CAUSES OF THE DISEASE

Failures from cracking even of the best quality of "Government bronze" castings, made under careful supervision are by no means unknown today, and it is not at all surprising that our venerated Liberty Bell, *having passed three times through the melting pots* and having been "doctored" by amateurs in metals, should still have traces remaining of the disease which caused its decay more than a century ago, and it behooves us, therefore, to guard this precious relic against all avoidable risks in the future for the sake of generations yet to come.

In conclusion, I wish to offer in behalf of future generations a warning to our present city fathers that if they pass a bill to send the Liberty Bell to the Panama Exposition for "the edification and inspiration of the nation," they are inviting disasters that may bring upon them anathemas instead of praises of the present generation as well as of all future citizens. Rather should they pass a bill prohibiting removal in the future of the bell from its peaceful resting-place in its proper home, Independence Hall.

The Daughters of the American Revolution were consulting counsel with a view to getting out an injunction in case the council passed the proposed bill. On account of this report of Mr. Outerbridge the bill was not presented to councils, as contemplated, on February 4 and it is probable the bell will remain in its proper resting place.

The abstracts of Mr. Outerbridge's report that were printed in the Philadelphia daily papers inspired several inquiries from him as to the disease of metals. In reply to these Mr. Outerbridge, who considers the term an accepted one in metallurgical phraseology and science, published the following communcation in the daily papers:

Recently an abstract of a report I made at the request of a member of the Philadelphia branch of the Daughters of American Revolution on the present condition of the Liberty Bell containing the foregoing phrase appeared in the Public Ledger and other daily papers. Since then I have received several inquiries regarding this statement, which appears fanciful, if not absurd, to persons who maintain that there is a definite boundary line, between living and non-living matter. Without entering into any argument on this debatable topic, I wish merely to refer such doubters to the famous "Faraday lecture" delivered by the celebrated Prof. Ernst Cohen, of Utrecht, on the "Tin Pest," before the Royal Society, London, in August, 1911, and reported in full, with numerous illustrations, in the Mechanical Engineer, April 19, 1912, Scientific American supplement and other technical periodicals.

DISEASE OF TIN

Engineering, London, November 3, 1911, contains a long editorial review of this remarkable address, in which it refers to the fact that the main facts of the decay of the metal tin were known half a century ago. "Erdmann noticed in 1851 that some organ pipes in the castle church of Leitz (Prussian Saxony) were decaying; he thought that the concussions to which the pipes were subject might, under certain conditions, cause a mechanical disintegration."

Referring to Professor Cohen's modern researches on the changes taking place in pure tin from the brilliant normal condition of the metal to a gray powder when exposed to cold weather for some weeks, the editor says: "Every particle of gray tin becomes a center for the formation of more gray tin; the transformation advances very slowly in the dense metal, but each particle of gray tin acts like the germ of a disease, and in this sense it may be said that the tin is infected, and that all tin is liable to infection with the tin disease or tin pest. In the cold galleries of museums the danger of tin infection is peculiarly great and this museum disease is very prevalent."

In the discussion following the address two of the most eminent living scientists, who have contributed much knowledge about the molecular structure of metals through their original researches (Professor Ewing and Doctor Rosenheim), referred to "strain diseases of metals," and Professor Cohen said in reply that he had purposely not referred to "strain diseases" in order to avoid confusion.

The foregoing brief references will suffice to show that my statement that "metallurgists have adopted into their technical phraseology the term diseases of metals" is abundantly corroborated by eminent authorities on metals in Europe.

ALEX. E. OUTERBRIDGE, JR.

Philadelphia, February 5, 1915.

EFFECT OF REMELTING COPPER

In further substantiation of this theory Mr. Outerbridge says that since writing the above he has seen a report of tests made in remelting pure copper several times under careful conditions. With each melting the metal lost largely in tensile strength, resilience, etc. Bending tests showed loss of over 50 per cent. from three meltings. The Liberty Bell was recast three times.

Early in April last year four additional supports were placed in the case on which the bell now rests, further relieving the strains. The beneficial effect, says Mr. Outerbridge, was soon apparent in a partial closing of the crack. "Should it be again sent on a railroad journey across the continent it is by no means unlikely that it would arrive there in two pieces."

It is estimated that years ago vandals used to chip pieces from the rim for souvenirs calculated to have amounted to anywhere from 20 to 40 lb. A member of the Daughters of the American Revolution in Philadelphia has records to prove that more strangers visit Independence Hall every year than any other museum in the United States, pointing to this as another reason why it should not be removed for many months from its resting place.

On February 11 the voice of the bell was conveyed by telephonic communication over 13,600 miles of copper wire from Philadelphia to San Francisco, 3400 miles. It was the first sound that journeyed across the entire length of this continent and it was the first time that the ancient bell has pealed officially since it cracked, tolling the death of Chief Justice Marshall, 80 years ago.

PANAMA CANAL COMPETITION

Lower All-Rail Rates to Pacific Coast Allowed by Commerce Commission

WASHINGTON, D. C., February 16, 1915.—The far-reaching effect upon transcontinental transportation of the opening of the Panama Canal is officially recognized in an order entered by the Interstate Commerce Commission on February 11. It is the result of an investigation to determine the extent of the relief to which the railroads are entitled under the decision of the Commission in the so-called Intermountain case as recently affirmed by the United States Supreme Court.

The decision of the Intermountain case by the Supreme Court was followed by the issuance of an order by the Commission which, while it required transcontinental carriers not to charge more from the Missouri River westward to an intermountain point than to the Pacific terminal, permitted them an excess charge to intermediate points on shipments from Chicago of 7 per cent., from Pittsburgh of 15 per cent., and from the Atlantic seaboard of 25 per cent. These concessions, presumably, would have been adequate to enable the roads to hold their through business had it not been for the shrinkage of rates from New York to San Francisco because of the opening of the Canal.

In the investigation to determine the reasonableness of the carriers' demands the Commission developed a very interesting situation. Since the opening of the Panama Canal the water carriers have materially reduced their rates, shortened the time of transportation, increased the frequency of sailing, added to their tonnage capacity and have enormously increased their coast-to-coast business. In the period of 30 days preceding October 6 last important reductions were made, including certain hardware items, from $1 to 80 cents; pulleys, from $1 to 90 cents; rail and track material, from 55 to 50 cents; castings, carload, from 80 to 30 cents; cast iron pipe, from 40 to 35 cents; stamped ware, less than carload, from $1.25 to $1; stamped ware, carload, $1 to 80 cents, and wire fencing, from 40 to 30 cents. It was further shown that the total tonnage moving by water from the Atlantic to the Pacific coast and to the Hawaiian Islands, which in 1911 was 397,000 tons; in 1912, 451,000 tons, and in 1913, 434,000 tons, for the single month of September, the first full month after the opening of the Panama Canal, amounted to 77,915 tons. While the movement by the Panama route for the month was not regarded as an infallible index as to what might be expected as the result of its operations, the Commission regarded it as indicative of a greatly increased activity on the part of the water carriers.

The evidence gathered also showed a reaching out by these water carriers to territory from which heretofore they have drawn but little if any traffic and the movement by water of various commodities that heretofore have moved almost exclusively by rail. Prominent instances of these include a shipment of 32 cars of cast-iron pipe from Birmingham, Ala., by rail to New Orleans, thence by water to the Pacific coast; 140 cars of structural iron originating in various parts of Pennsylvania; 50 cars of wire fencing from Pennsylvania points; 1200 tons of rails from Lorain, Ohio; 653 pieces of wrought-iron pipe from Wheeling, W. Va., and 15,000 tons of wrought-iron pipe from Youngstown, Ohio. From these facts it was made evident to the Commission that whatever may have been the degree of competition in the past between the rail carriers and the water carriers, the country is now witnessing a new era in transportation between the Atlantic and Pacific coasts and that to secure any considerable percentage of this coast-to-coast traffic rates on many commodities must be established by the rail carriers materially lower than those now existing.

The Commission decides that on about 25 items which move in carloads from the Missouri river to the Pacific coast at rates less than 75 cents per 100 lb., carriers may be permitted to establish reduced rates to San Diego, San Francisco, Oakland, Portland, Tacoma, Seattle, etc., and to continue rates to intermediate points not higher than 75 cents per 100 lb. From Chicago, Buffalo and New York carriers are permitted to carry carload rates to intermediate points 15, 25 and 35 cents, respectively, higher than from the Missouri river to the same destinations.

Less-than-carload commodity rates on articles classified as first or second class in the western classification, which are less than $1.50 per 100 lb. from the Missouri river to the Pacific coast may be exceeded at intermediate points, but the rates on such articles to such intermediate points must not exceed $1.50 per 100 lb. Less-than-carload commodity rates on articles classified as third class or lower in western classification, which are less than $1.25 per 100 lb. from the Missouri river to the Pacific coast, may be exceeded at intermediate points, but the rates on such articles to such intermediate points must not exceed $1.25 per 100 lb. Less-than-carload commodity rates from Chicago, Pittsburgh and New York to intermediate points may exceed the rates from the Missouri river to the same destinations by 25, 40 and 55 cents, respectively.

The articles on which through rate reductions are permitted by the Commission's order include structural iron and steel, fabricated and unfabricated, bars, shafting, slabs, rods, hoops, bands, billets, blooms, ingots, bolts, nuts, rivets, lag bolts, butts and hinges, castings, chain, fencing, cast-iron pipe, sheets, hardware, stoves, radiators, sectional boilers, stove pipe iron, wire and wire goods. Carload rates on coal and pig iron may be less to the Pacific coast than to intermediate points, but the rates on such articles to the higher-rated intermediate points must not exceed 5 mills per ton-mile.

The Commission adds the suggestion that rates to intermediate points near the Pacific coast terminals may be made by adding to the rates to the terminals something less than the locals from terminals to destination. To what extent the rail carriers will avail themselves of the Commission's permission to revise their rates cannot be positively stated, but members of the Commission assume that substantially all the authorized reductions in through rates will be made and that rates to intermediate points will be held at the highest level consistent with this order. W. L. C.

Finishing Temperatures of Rails*

Reheating the Blooms and the Effect on the Grain Size, Physical and Wearing Properties—More Ductile Rails Result

BY W. R. SHIMER

In his valuable report on "Finishing Temperatures and Properties of Rails," Technological Paper No. 38, Bureau of Standards, Dr. G. K. Burgess, chief of the division of metallurgy, United States Bureau of Standards, has begun a line of investigation which should be continued by those interested in the subject, and who have proper facilities for carrying out the work. For the past year or more the Bethlehem Steel Company has been conducting experiments to learn the effect of rail finishing temperatures on their physical properties and microstructure and the results are here given for the consideration of those interested in the rail situation.

Considerable differences of opinion have been expressed by various authorities, in the past, as to the effect of large or small grain size and high or low finishing temperatures of steel rails on their physical properties and wearing qualities. Low finishing temperatures and, therefore, low shrinkage, have been advocated on the theory that the wearing qualities would be improved. Others have recommended high finishing temperatures.

GENERALLY ACCEPTED CAUSE OF FAILURE

The generally accepted cause for rail failures, due to the development of transverse fissures, is excessive wheel pressure on hard rails. One of the causes advanced for hard rails has been that they contain too high percentages of carbon and manganese; another that the rails were finished at too low a temperature, at or near the critical point.

In the experiments herein described the rails were rolled from reheated blooms. All the rail blooms were charged hot in a reheating furnace and brought up to about the original ingot-rolling temperature before rolling into rails. These rails gave better results in deflection, withstood a greater number of drops before breaking, and showed greater ductility, than rails of identically the same composition and section which were rolled direct from the ingot. Rails rolled from reheated blooms, finished at somewhat higher temperatures than when rolled direct from the ingot, have a different microstructure, which the writer does not believe is due so much to the difference in finishing temperatures, as to the difference in reduction in one heat. For example, a direct-rolled rail is reduced from the ingot to the rail in one heat, whereas when the blooms are reheated, all the strains set up in the reduction of the ingot to the bloom are relieved during the reheating process.

*From a paper presented at the New York Meeting of the American Institute of Mining Engineers, February 15. The author is Metallurgist of the Bethlehem Steel Company.

Fig. 1—Some of the Rails After Being Subjected to Drop Tests

COMPARISON OF DIRECT-ROLLED RAILS AND OTHERS

A few results of drop tests on rails of identical section and of approximately the same composition are given, comparing rails rolled direct with those rolled from reheated blooms:

Heat A—100-lb. Rails Rolled Direct*
C, 0.630; Mn, 0.64; Si, 0.068; P, 0.018; S, 0.032 per cent.

Ingot No.	No. of drops	Permanent set, in.	Elongation 1 in.	2 in.	3 in.	4 in	5 in.	6 in.	Total
2	1	1.08	0.05	0.07	0.06	0.05	0.05	0.04	0.32
11	1	1.07	0.05	0.06	0.07	0.05	0.05	0.04	0.32
	2	2.02	0.10	0.11	0.11	0.10	0.09	0.06	0.57
	3	4.06	0.13	0.14	0.15	0.13	0.12	0.12	0.96
	4	Broke	Not measured						
10	1	1.07	0.06	0.06	0.06	0.05	0.05	0.03	0.31

Average deflection after the first drop, 1.07 in.

Heat B—100-lb. Rails Rolled from Reheated Blooms (Compare with Heat A).*
C, 0.600; Mn, 0.66; Si, 0.080; P, 0.018; S, 0.034 per cent.

Ingot No.	No. of drops	Permanent set, in.	Elongation 1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	Total
3	1	1.60	0.04	0.05	0.05	0.05	0.04	0.03	0.26
	2	2.90	0.08	0.10	0.11	0.11	0.09	0.07	0.56
	3	4.15	0.10	0.13	0.16	0.17	0.15	0.11	0.82
	4	5.40	0.11	0.14	0.17	0.19	0.16	0.12	0.89
	5	Broke	0.11	0.14	0.18	0.19	0.17	0.14	0.93
2	1	1.60	0.04	0.05	0.05	0.05	0.04	0.03	0.26
1	1	1.40	0.05	0.06	0.07	0.07	0.06	0.03	0.34

Average deflection after the first drop, 1.53 in.

Heat C—100-lb. Rails Rolled Direct (Compare with Heat D).*
C, 0.646; Mn, 0.81; Si, 0.105; P, 0.028; S, 0.029 per cent

Ingot No.	No. of drops	Permanent set, in.	Elongation 1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	Total
2	1	1.30	0.03	0.03	0.05	0.05	0.05	0.03	0.24
	2	2.30	0.04	0.06	0.08	0.09	0.09	0.08	0.44
	3	3.30	0.07	0.09	0.13	0.15	0.14	0.11	0.69
Middle	1	1.20	0.02	0.03	0.04	0.05	0.04	0.04	0.22
	2	2.30	0.06	0.07	0.08	0.09	0.08	0.07	0.45
Last	1	1.20	0.03	0.04	0.05	0.05	0.04	0.03	0.24

Average deflection after the first blow, 1.23 in.

Heat D—100-lb. Rails Rolled from Reheated Blooms*
C, 0.648; Mn, 0.83; Si, 0.081; P, 0.028; S, 0.031 per cent.

Ingot No.	No. of drops	Permanent set, in.	Elongation 1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	Total
1	1	1.45	0.04	0.04	0.06	0.05	0.04	0.03	0.26
	2	2.60	0.06	0.08	0.12	0.09	0.09	0.05	0.49
	3	3.70	0.10	0.13	0.17	0.15	0.12	0.09	0.76
	4	4.70	0.10	0.13	0.17	0.17	0.13	0.11	0.83
	5	Broke	0.12	0.14	0.18	0.18	0.15	0.11	0.88
2	1	1.45	0.06	0.07	0.07	0.06	0.04	0.03	0.33
3	1	1.50	0.04	0.05	0.06	0.05	0.04	0.03	0.27

Average deflection after the first drop, 1.47 in.

Heat E—100-lb. Rails Rolled Direct (Compare with Heat F).*
C, 0.740; Mn, 0.78; Si, 0.104; P, 0.020; S, 0.033 per cent.

Ingot No.	No. of drops	Permanent set, in.	Elongation 1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	Total
2	1	1.01	0.04	0.05	0.03	0.03	0.02	0.02	0.19
	2	1.90	0.05	0.06	0.07	0.08	0.05	0.05	0.36
10	1	1.01	0.04	0.04	0.04	0.04	0.02	0.02	0.20
19	1	1.01	0.03	0.04	0.05	0.05	0.04	0.03	0.24

Average deflection after the first drop, 1.01 in.

Heat F.—100-lb. Rails Rolled from Reheated Blooms
C, 0.750; Mn, 0.81; Si, 0.071; P, 0.018; S, 0.029 per cent.

Ingot No.	No. of drops	Permanent set, in.	Elongation 1 in.	2 in.	3 in.	4 in.	5 in.	6 n.	Total
1	1	1.50	0.04	0.05	0.05	0.05	0.03	0.03	0.25
	2	2.60	0.06	0.09	0.11	0.10	0.09	0.07	.52
	3	3.70	0.09	0.12	0.15	0.15	0.14	0.09	0.74
	4	4.80	0.10	0.15	0.18	0.18	0.15	0.10	0.86
	5	6.00	0.12	0.16	0.19	0.19	0.16	0.12	0.94
			Not tested to destruction						
2	1	1.40	0.06	0.06	0.07	0.07	0.05	0.04	0.35
3	1	30	0.02	0.04	0.05	0.05	0.04	0.03	0.23

Average deflection after the first drop, 1.40 in.

Drop Tests of Rails from Reheated Blooms Superior.—The drop-test results of the rails rolled from reheated blooms were superior to those of rails rolled direct from the ingot.

Numerous records of direct-rolled rails show the results of drop tests from the same heat to be not uniform with test pieces of uniform chemical composition, taken from the same position in the ingot and free from segregation.

Drop tests of rails rolled from reheated blooms show consistently uniform results under the same conditions.

The reason rails rolled direct do not show uniform drop-test results seems to be that, when two or three blooms are rolled from an ingot, rails rolled from the first bloom are finished at the highest temperature, rails rolled from the second bloom are finished at the next highest temperature, while the rails rolled from the last bloom of the ingot are finished at a considerably lower temperature than the first two. If there are any delays at the mill and any blooms are held up they sometimes become too cold to roll, and if they are just hot enough to roll the rails will be finished below the average temperature.

In the case of rails rolled from reheated blooms a uniform temperature can be obtained on all rails rolled. One bloom is drawn from the reheater at a time and sent through the mill. If there is any delay at the mill the blooms remain in the reheater until the mill is ready to roll them. Any desired temperature can be maintained in the reheating furnace so as to obtain the desired finishing temperature on the rails. The temperature of the reheater is regulated according to the composition and section of the rails being rolled.

DETAILS OF THE INVESTIGATION

Nine 19 by 23 in. ingots from the same heat were each rolled into two "three-rail" blooms, each ingot making two blooms, or six rails 33 ft. long of 100-lb. section. The composition of this heat was: C, 0.720; Mn, 0.73; P, 0.019; S. 0.037 per cent. These 18 blooms were charged direct from the bloomer into the reheating furnace and heated up to the original ingot-rolling temperature and, after drawing from the furnace, some were held for different lengths of time, before rolling, so as to obtain a range of high and low finishing temperatures on the rails rolled from them.

Finishing temperatures were measured on all the rails directly after leaving the finishing rolls. Shrinkages were measured on all the rails. A drop-test piece, 4 ft. long, was cut from each *A*, *B*, *C*, *D*, *E* and *F* rail from each of the nine ingots, making a total of 54 drop-test pieces. A short piece, 6 in. long, was cut from each rail directly back from where the drop-test pieces were cut. A standard tensile bar (0.505 in. dia. by 2 in. long) was turned up from both sides of the head of these short rail sections—one from the bottom side of the head of each section as it cooled on the bed, and one from the top side—making 108 tensile bars.

Next to the piece for tensile test a thin section was sawed from the head of each of the 54 rails, and used for making Brinell hardness tests. Finishing temperatures ranging from 2147 deg. to 1652 deg. F. were obtained in this experiment. For convenient study, the results of drop tests, physical tests, Brinell tests and check carbons, on all the rails are given in a table in the original paper.

Ingots were numbered from one to nine, inclusive. The positions of the rails in each ingot were as follows: *A* the top rail of the ingot, *B* the second from the top, and so on down, *F* being the bottom rail of the ingot. The *A*, *B* and *C* rails of all ingots were rolled from the upper bloom; the *D*, *E*, and *F* rails were rolled from the bottom bloom of the ingots. The shrinkage recorded are averaged from measurements of the three rails rolled from each of the 18 blooms. The finishing temperatures are fairly consistent with the shrinkages, but there are a few cases where they are not quite so, due to the difficulty experienced by the operator of the optical pyrometer in matching the color correctly. A microscopic examination was made of the threaded end of each of the 108 tensile bars.

The Drop Tests.—All rails were tested head up. Six 1-in. spaces were marked with a center punch on the base of the test piece, and elongations were measured from these punch marks after the rail broke. In some cases the rails bent almost at right angles without breaking in the base; in these cases the elongations are not as great as they would have been had the rail broken in the base. Figs. 1 and 2 show some of the test pieces which bent to almost 90 deg. without breaking in the base, proving them to be exceedingly ductile, although the ductility measurement does not indicate this. The hight of drop was 18 ft. and the weight of the tup 2000 lb.

The following summary is drawn from a practical standpoint based on the results of the various tests and microscopic examinations and a study of numerous records.

SUMMARY OF THE RESULTS

No appreciable difference in grain was found to indicate that the size or structure was governed by a difference in finishing temperature.

There was practically no free ferrite in any of the *A* rails, slightly more in the *B* rails, more in the *C* rails, and so on; the *E* and *F* rails from all the nine ingots contained an almost complete network of free ferrite.

The *A*, *B*, *C* and *D* rails all had a more or less sorbitic structure, and the *E* and *F* rails were not sorbitic. The only explanation the writer can offer for this consistent difference between the microstructures of the various rails according to their position in the ingot is as follows:

1.—The absence of free ferrite in the *A*, *B*, and *C* rails seems to be due partly to the presence of a consistently higher percentage of carbon than in the *D*, *E*, and *F* rails.

2.—When these experimental rails were rolled,

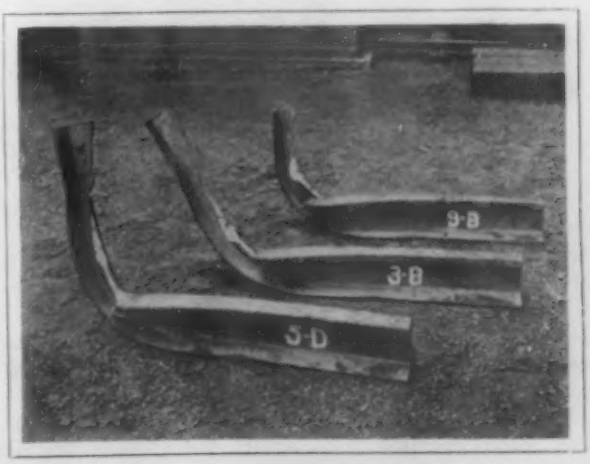


Fig. 2—Some of the Rails After Being Subjected to Drop Tests

the rails from each ingot were kept apart on the bed to avoid their being mixed. For example: When bloom 1*ABC* was rolled, the *A* rail was sawed to length first, and the *C* rail last. When they were put on the bed, the *C* rail was first, the *B* rail next with its base resting against the head of the *C* rail, and the *A* rail last with its base against the head of the *B* rail. These rails were cooling at least 3 to 5 min. before the *D*, *E*, and *F* rails from the bottom bloom of No. 1 ingot came along. When the *D*, *E* and *F* rails went over to the bed, the *F* rail went first, a small space being left between it and the *A* rail; the base of the *E* rail rested against the head of the *F* rail, and the base of the *D* rail rested against the head of the *E* rail. The head of the *D* rail was left exposed. Therefore, the rails from the various ingots cooled at different rates of speed. The heads of all the *A* rails were air cooled and the structure was sorbitic. The heads of the *B* and *C* rails cooled more slowly on account of having hot rails resting against them, consequently these rails contained more free ferrite than the *A* rails. The *C* rails contained more ferrite than the *B*, and the *B* more than the *A* rails. The head of the *C* rails had an annealing effect longest, the *B* next, and the *A* rail none.

As to the *D*, *E*, and *F* rails, the *F* rail was the first to have a hot rail resting against its head, the *E* rail next, while the head of the *D* rail was air cooled. This, it seems to me, shows that this consistent difference in the separation of free ferrite, according to the position of these rails in the ingot, is due simply to the difference in the rate of cooling of the rails.

In order to learn what would happen if samples of *A*, *B*, *C*, *D*, *E*, and *F* rails from the same ingot were all annealed at the same temperature and cooled at the same rate of speed, samples from rails 1*A*, 1*B*, 1*C*, 1*D*, 1*E*, 1*F*, 9*A*, 9*B*, 9*C*, 9*D*, and 9*E* were charged in the same muffle furnace, heated to slightly above the critical point (1450 deg. F.), and left to cool slowly in the furnace over night. Micrographs, taken of the structures of these pieces after annealing showed that the structures of all the rails, except 1*F*, were about the same, and contained no free ferrite. Rail 1*F* contained a network of free ferrite, but as this sample contained only 0.622 per cent. carbon and the other 10 samples contained no less than 0.680 per cent., the difference in structure of this sample could be due to its lower carbon content. In the other 10 samples the aggregate of ferrite and pearlite has changed to a homogeneous solid solution.

The difference in carbon, together with the difference in the rate of cooling, accounts for the separation of free ferrite in some instances and the non-separation in others.

EFFECT OF ANNEALING

The above samples were afterward heated to 1800 deg. F. and allowed to cool slowly in the furnace over night. These samples were polished and etched and photomicrographs taken of their respective structures. In this case the grain size increased and free ferrite separated out in the boundaries of the pearlite crystals. Approximately the same amount of free ferrite was observed in all the pieces, showing that when heated to a rail-finishing temperature and allowed to cool at the same rate of speed the microstructure is the same throughout, regardless of the position of the rail in the ingot.

The average physical results of the 54 tensile bars tested from all the *A*, *B*, and *C* rails are as follows:

Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation, per cent.	Contraction, per cent.
125,130	64,150	14.0	19.12

The average physical results of the 54 tensile bars tested from all the *D*, *E*, and *F* rails are as follows:

Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation, per cent.	Contraction, per cent.
116,300	59,720	16.2	24.54

The average carbon content of the *A*, *B*, and *C* rails is 0.711 per cent.; of the *D*, *E*, and *F* rails, 0.678 per cent.

The *A*, *B*, and C rails are three points higher in carbon; higher in tensile strength; higher in elastic limit; and lower in elongation and contraction of area than the *D*, *E*, and *F* rails. Apparently the slight difference in carbon content has caused the difference in physical properties. Check analyses were made for manganese, silicon, phosphorus, and sulphur, and all the results were so close to the original heat analysis that the difference in physical properties cannot be due to these elements.

PHYSICAL PROPERTIES

The following are the average carbon contents and average tensile results (each an average of six tests), finishing temperatures, and shrinkage of the rails rolled from each bloom:

ABC rails, ingot	Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation, per cent.	Contraction, per cent.	Carbon, per cent.	Finishing temperature, deg. F.	Shrinkage, inches
1	128,000	66,600	14.6	17.91	0.712	2,146	6.60
2	124,330	64,660	12.8	16.90	0.713	2,138	6.69
3	125,910	64,330	13.9	20.20	0.702	2,049	6.64
4	128,000	64,660	14.2	19.04	0.711	2,120	6.77
5	125,660	65,180	11.9	17.39	0.700	2,147	6.64
6	123,660	63,110	14.4	20.56	0.700	2,012	6.37
7	124,500	63,350	14.1	19.84	0.706	1,868	6.06
8	124,500	63,330	16.0	20.30	0.733	1,850	5.85
9	121,600	61,800	14.1	19.98	0.714	1,832	5.66
Average	125,130	64,150	14.0	19.12	0.711		
DEF rails, ingot							
1	118,750	60,500	15.6	24.71	0.669	2,020	6.44
2	116,580	59,660	16.5	23.90	0.664	2,084	6.63
3	116,830	60,670	15.9	23.07	0.667	2,120	6.71
4	116,100	59,500	15.7	22.41	0.650	2,147	6.65
5	116,000	59,500	16.1	24.09	0.676	2,048	6.56
6	116,100	60,400	15.7	22.07	0.665	1,904	6.37
7	115,660	59,500	16.6	25.81	0.674	1,850	5.81
8	115,400	59,250	16.9	24.83	0.681	1,841	5.69
9	115,330	58,910	17.0	30.00	0.689	1,652	5.37
Average	116,300	59,72	16.2	24.54	0.678		

The above shows that the rails finished at high temperatures have the same strength and ductility as those finished at low temperatures, this conclusion being confirmed by a study of the drop-test results and the photomicrographs. The latter show that the structure of all the *A* rails is identical; all the *B* rails have the same structure; in short, all rails from the same relative position in the various ingots show the same microstructure. The only difference found, regardless of finishing temperatures, was between the physical properties of the *A*, *B*, and *C* rails and the *D*, *E*, and *F* rails, which was dependent upon the position of the rails in the ingot. The difference in microstructure was due to the rate of cooling when the rails were on the bed.

RAILS ROLLED DIRECT FROM INGOTS

The above results refer to rails rolled from reheated blooms. From past experience it has been noticed that the rails rolled direct from the ingot do show differences in physical properties, varying in accordance with their finishing temperatures. The difference, it seems, is due to the fact that when rolling direct from a 19 x 23 in. ingot, or an 18 x 19 in. ingot, considerable strains are set up during this continued reduction, which are increased or decreased according to the finishing temperature.

When rails are rolled from reheated blooms, all the strains set up during the reduction of the ingot to the bloom are removed during the reheating process, since the blooms are reheated to or near the original ingot-rolling temperature. The percentage of reduction from the bloom to the finished rail is not so great as from the ingot to the finished rail, consequently no such strains are set up and therefore a difference in finishing temperature does not seem to affect appreciably the physical properties and microstructure of rails rolled from reheated blooms.

A careful study of the results of the drop tests recorded in this report shows that the rails finished at high temperatures are equally as good as those finished at the lower temperatures. Figs. 1 and 2 show drop-test pieces representing the following rails:

1-E—Finished at 2020 deg. F.; shrinkage 6.44 in.; stood six drops and did not break in the base.
1-F—Finished at 2020 deg. F.; shrinkage 6.44 in.; stood six drops and did not break in the base.
3-B—Finished at 2048 deg. F.; shrinkage 6.64 in.; stood five drops and did not break in the base.
4-C—Finished at 2120 deg. F.; shrinkage 6.77 in.; stood five drops and did not break in the base.
5-D—Finished at 2048 deg. F.; shrinkage 6.55 in.; stood five drops and did not break in the base.
9-B—Finished at 1832 deg. F.; shrinkage 5.66 in.; stood six drops and did not break in the base.

In addition to those shown in the photographs, 9-D and 9-E finished at 1652 deg. F.; shrinkage 5.37 in.; stood six drops and five drops respectively and broke in the same manner as those illustrated.

The following drop-test pieces also broke in the manner above described: 1-A, 1-D, 1-E, 1-F, 2-A, 3-A, 3-B, 3-C, 3-D, 4-C, 4-D, 4-E, 5-A, 6-A, 6-B, 6-C, 7-D, 9-B, 9-D and 9-E. These drop-test pieces represent a wide range of finishing temperatures, shrinkage, and microstructure, but have almost identical physical characteristics as shown by the results of this test, which is the important test of the quality of a rail.

GENERAL CONCLUSIONS

The conclusions above are based on the results of a carefully carried out investigation along practical lines. The primary object of these experiments was to determine the best finishing temperature for steel rails. There was a variation of 500 deg. F. in the finishing temperatures and a variation of 1.34 in. shrinkage. Even with this wide range in temperature and shrinkage, it was impossible to determine, from the results of the respective tests, at what temperature a rail should be finished in order to obtain the best results, since all the tensile and drop-test results recorded are good, and practically identical. The results show it is equally impossible to decide what microstructure and shrinkage are desirable.

Further, from the results of this investigation we have learned that rails rolled from reheated blooms are more ductile than those rolled direct from the ingot, regardless of their finishing temperature. Also, we have learned to be cautious with regard to judging from the microstructure as to the temperature at which a rail was finished and to be careful in drawing conclusions from the microstructure, alone, in rail-failure investigations. The microstructure appears to be controlled more by the rate of cooling from above the critical point than it does by the temperature at which it was finished. In regular practice rails cool uniformly, since hot rails are going to the bed continually, and therefore the microstructures do not vary as much as they have in this experiment.

Further investigations on this subject are being conducted and the results may be published at some future date.

Fluorspar and Basic Slags

In basic open-hearth furnace practice, fluorspar (CaF_2) is added to render the basic slag more fluid and it is very efficient. Different theories have been offered to explain the chemical reactions that take place to give the results noted. The following theory, offered by W. S. Hamilton, chief chemist of the American Steel Foundries, and located at Granite City, Ill., in a communication to Metallurgical and Chemical Engineering, sheds considerable light on the subject:

In adding fluorspar we add calcium which, as the oxide, would naturally give us a more basic slag, hence a thicker one. We also add fluorine, which we would expect to unite with silicon and pass off as a gas silicon fluoride. This removal of silicon would also naturally make the slag more basic, hence thicker. However, we know that the slag is made thin to a very great extent when small percentages of fluorspar are added. The amount of fluorspar necessary being very small, the actual addition of a little calcium and removal of a little silicon would really give no apparent results. The remarkable fluidity conferred by a small amount of fluorspar being added to a molten slag has suggested to me that the reaction may be a catalytic one, the fluorspar being only an agent.

Reactions which I believe may account for the thinning of a basic slag are shown in the following two simple equations, although no doubt more complex reactions do take place. Silica reacts with fluorspar to yield silicon fluoride and calcium silicate.

$$3SiO_2 + 2CaF_2 = SiF_4 + 2CaSiO_3$$

Lime reacts with silicon fluoride to yield fluorspar and calcium silicate.

$$3CaO + SiF_4 = 2CaF_2 + CaSiO_3$$

In the first equation the fluorspar reacts with the silica in the slag, giving us silicon fluoride (a gas) and calcium silicate, a fusible slag. Part of the silicon fluoride will escape, but a greater part will react with the lime, giving us our fluorspar again and more calcium silicate, the fusible slag. This newly formed fluorspar will react with more silica as in the first equation, and the circle is repeated until all the silicon-fluoride gas has escaped. In each reaction some silicate of calcium is formed, which is a slag with a low melting point, and the fluorspar has only been an agent to unite the silica and lime, either of which alone is fused with difficulty.

Mechanical Engineers' New Boiler Code

On February 13 the council of the American Society of Mechanical Engineers accepted the report of the society's boiler code committee. This act marks the completion of an undertaking begun 3½ years ago. The history of the measure has been given in these columns up to and including the annual meeting of the Society in December. As a result of the discussion at this meeting an advisory committee of 18 members was appointed to sit with the original committee in a final attempt to revise the code, and the fifth revision was begun on December 15, continued day and night for practically seven weeks, with a majority of the committee in attendance at all of the sessions.

At the meeting of the council mentioned it was decided to consolidate the original and the advisory committees, and to continue the new body thus formed until the council should determine otherwise. It is planned to present the code at the spring meeting to be held at Buffalo in June, and it is expected that the committee will be made a standing one. It is planned to have the consolidated boiler code committee meet every year or two to revise the code, as advances in the state of the art may make necessary. In the boiler law enacted by the Wisconsin Legislature, which became effective January 1, it was provided that the sections relating to new boilers should be those adopted by the American Society of Mechanical Engineers, which are embraced in part 1 of the new code. It is also expected that the code in part, if not in its entirety, will be the basis of enactment by the Indiana Legislature, which is now in session.

VANADIUM STEEL RAILS

Test of a 105-lb. Section Rolled for the Lackawanna Railroad

Two 100-ton heats of vanadium steel rails were recently made for the Delaware, Lackawanna & Western Railroad by Pennsylvania Steel Company. The rails were rolled to the Lackawanna 105-lb. section. The heats were made to the standard composition being furnished to the railroad, except for the addition of vanadium and the reduction of 0.10 to 0.15 per cent. in carbon.

The vanadium rails were required to meet the same drop test requirements as to deflection and ductility prescribed for the standard Lackawanna rails, which call for a minimum and maximum deflection on the first blow. The results of the tests, obtained from the American Vanadium Company, show that the vanadium rails with 10 to 15 points lower carbon than the rails without vanadium have about 40 per cent. higher elastic limit, or useful strength. These figures are shown in the accompanying table, which gives the results for rails from two heats with the vanadium and two heats without, the physical characteristics showing the minimum and maximum values of elastic limit, tensile strength, elongation and reduction in area and also the minimum and maximum figures for the Brinell hardness tests. The vanadium rails show also greater hardness.

The records of the drop test showed that with the increased strength and hardness the vanadium rails gave the same deflection under the first blow and slightly better ductility. Eight tests in all were made of each rail for tensile strength and eleven tests for hardness. An etched cross-section is here reproduced for both the carbon and the vanadium rails. The records may be taken as supplementary to an account of the tests of carbon and vanadium steel rails rolled by the Cambria Steel Company and published in *The Iron Age* of October 15, 1914.

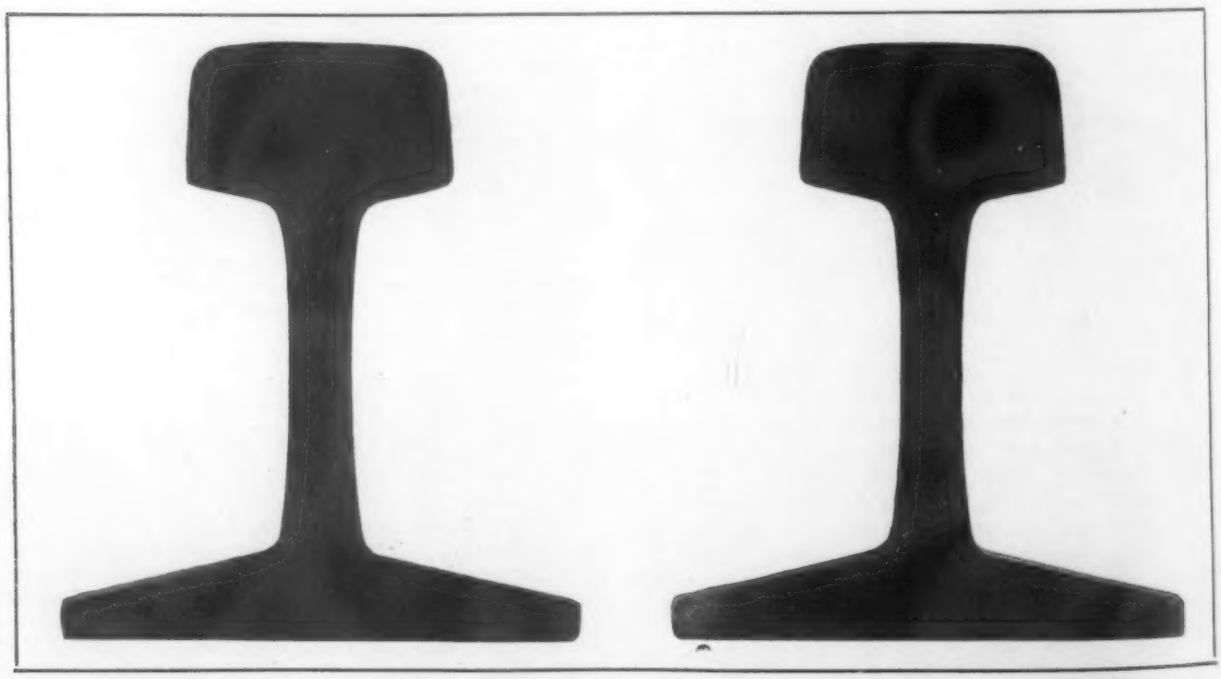
Vanadium Steel in 1914 Locomotives

Vanadium steel parts were used in 39 per cent., or in 491 of the 1265 locomotives built in 1914. This is an increase of 21 per cent. as compared with the corresponding ratio for 1913. These figures take into account all classes and weights. Considering only the heavier locomotives, those weighing 225,000 lb. and over, the number using vanadium parts in 1914 was 60 per cent. of the total, which, compared with 48 per cent. in 1913, is an increase of 25 per cent. Some of the roads which are extensive users of vanadium steel did not purchase any engines in 1914.

American steel sheet piling is now being extensively used in India, says Consul General Henry D. Baker, of Bombay, in Commerce Reports. It is replacing wooden timbering in supporting the sides of sewer trenches and it is said it may also come into much larger use in building bridge piers, coffer-dams, reservoir work, etc.

Vanadium and Carbon Basic Open-Hearth Rails Compared

Heat number	28380		21168		27601		28382	
	Corner of head	Top of web	Corner of head	Top of web	Corner of head	Top of web	Corner of head	Top of web
Carbon, per cent	0.47	0.48	0.56	0.57	0.66	0.64	0.63	0.66
Manganese, per cent	0.68	0.69	0.72	0.72	0.67	0.66	0.64	0.65
Chrome, per cent	0.25	0.26	0.12	0.12	0.24	0.25	0.24	0.24
Nickel, per cent	0.47	0.48	0.35	0.34	0.46	0.45	0.45	0.45
Vanadium, per cent	0.132	0.132	0.168	0.169	....	....	....	....
Phosphorus, per cent	0.011	0.012	0.013	0.012	0.019	0.019	0.020	0.020
Sulphur, per cent	0.052	0.054	0.058	0.059	0.059	0.060	0.054	0.055
Silicon, per cent	0.11	0.12	0.11	0.11	0.15	0.15	0.14	0.13
Elastic limit, lb. per sq. in.	80,000		87,000		59,000		56,000	
	85,000		90,000		62,560		63,000	
Tensile strength, lb. per sq. in.	137,000		137,000		127,000		126,000	
	140,000		145,000		136,000		132,000	
Elongation in 2 in. per cent.	10		9		8		9	
	12		11		12		12	
Reduction area, per cent.	14		15		13		14	
	24		21		22.5		22.5	
Hardness, Brinell	277		286		262		255	
	311		302		286		286	



Carbon Rail — Vanadium Rail

Etched Sections of Basic Open-Hearth 105-lb. Steel Rails for the Delaware, Lackawanna & Western Railroad

Bevel Gear Roughing Shaping Machine

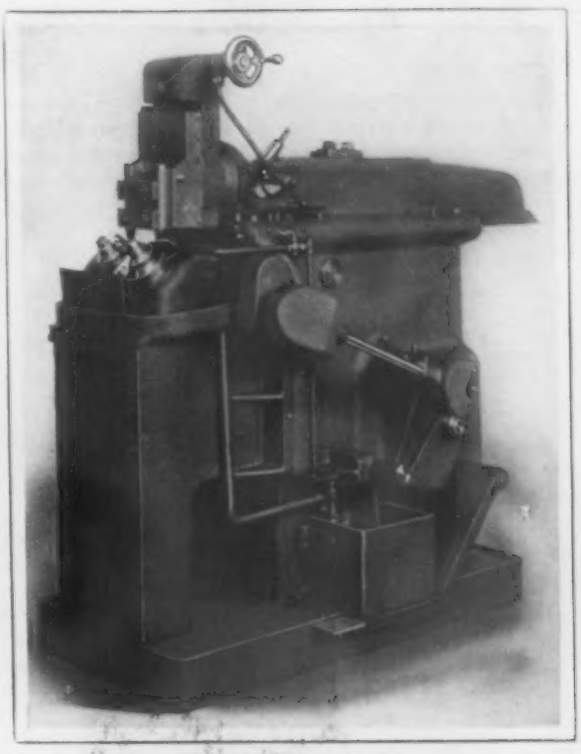
A multiple-spindle bevel gear roughing shaping machine has been designed by Gould & Eberhardt, Newark, N. J. The principal function of the machine is to take care of the roughing or stocking out of bevel gears preparatory to having them finished on a bevel gear planing machine. The new machine is a modification of the builder's standard high-duty shaping machine, and the important changes are a new style of head operating with a cam feed arrangement and a new type of main lever arm. One of the particular fields for which this machine is adapted is the roughing out of automobile differential steel gears. These have projecting hubs on the cone or small end of the gear, which, it is pointed out, would prevent them from being roughed in the simple disk cutter type of gear-cutting machine, as on account of the hub interfering with the diameter of the cutter the rotary cutter would not be able to cut the entire face of the gear.

It is pointed out that the major portion of the time required for cutting a bevel gear is consumed in roughing out the blank. As the gear-planing machine that is ordinarily employed for the production of bevel gears is more expensive than a shaping machine, it is apparent that by having the roughing done on a shaping machine and finishing the gears on a planing machine economies of time are effected. The large number of metal removing strokes of a shaping machine, in this case 100 per min., it is emphasized adapt this machine for the roughing of the blanks. One or two bevel gear blanks are held at the proper angle and indexed at each return stroke of the ram, while the head is automatically fed down at each stroke until the proper depth is reached. At this time the feed is thrown out automatically and the blank or blanks, as the case may be, are removed.

A cam feed arrangement for the head has been substituted for the vertical feed screw arrangement formerly employed to give the vertical feed. Among the advantages claimed for this arrangement are that the cutting strains are controlled and the amount of feed can be varied, according to the location of the cutting tool in the blank, thus enabling the feed to be decreased from the maximum rate when the tool is just entering the blank to a very fine feed when the tool is in the full depth of the tooth.

The main lever arm has the link located on top of the lever to take up the lost motion occurring in the operation of the ram. This arrangement, it is emphasized, enables but two steel gears to be used, and the machine is equipped with a single-pulley drive.

Another change that has been made in the machine as compared with the builder's high-duty shaping machine is the removal of the regular crosshead slide and table and the substitution of a special workhead with indexing mechanism. The former can be arranged to cut one or two gears simultaneously up to the capacity of the machine. Means for holding the blanks rigidly and lubricating the tools and the rapid removal of the former when finished and their replacement with new blanks are provided. In the accompanying illustration two nickel-steel bevel gears with 20 teeth are being roughed out simultaneously in approximately 3 min. each. The blanks have projecting hubs, and to remove the chips that accumulate in the groove between this hub and the inside face of the gears, two hook tools are provided that fit into the groove under spring tension. These tools can be thrown out of position when a blank is being removed.



A Multple-Spindle Shaping Machine for Roughing Bevel Gears at Work on Two Blanks Simultaneously. The Cutting Time with the Rams Running at 100 Strokes Per Min. Is 3½ Min. Each.

The indexing of the blanks from one tooth to the next takes place at every return stroke of the ram, when the tool is clear of the work, an arrangement which, it is pointed out, is positively controlled by the reciprocating movement of the ram. When the indexing has been completed, the work spindles are locked before the tool engages the work, so that the blank is securely held while the cut is being taken. While the indexing is being performed the automatic feed to the head operates and continues to do so until the feed cam has made one revolution and comes to the point where the feed is started. At this time the head jumps out of the cut and is ready to start on another set of blanks.

A Gasoline Operated Locomotive Bucket Crane

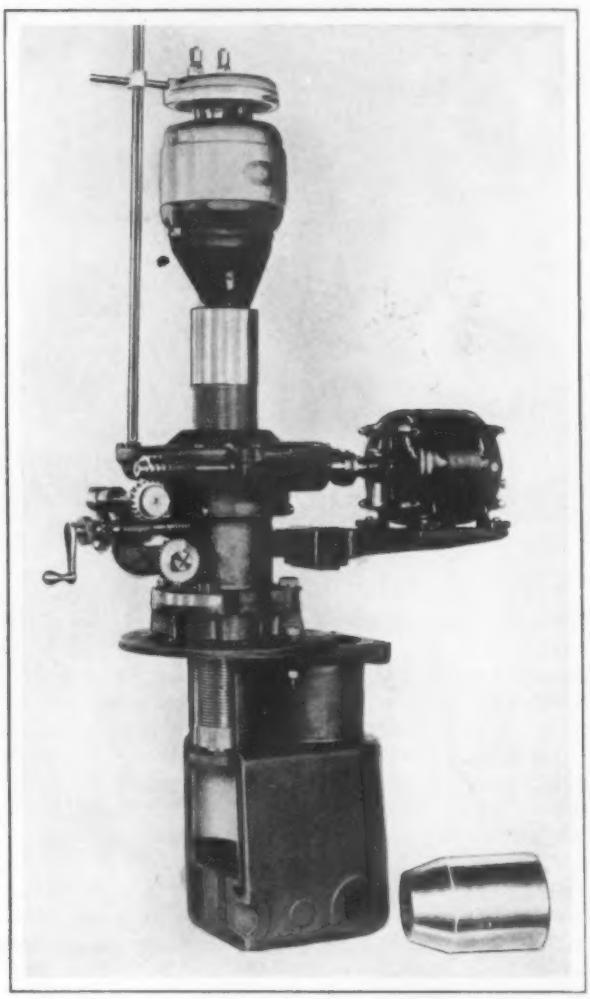
A small locomotive bucket crane that is operated by a gasoline engine has been added to the line of locomotive and wrecking cranes built by the Industrial Works, Bay City, Mich. One of the advantages of a crane of this type is that it is available for use without waiting to get up steam, and the fuel is not consumed when the crane is not actually working. The particular fields for which the crane is intended are light or intermittent work, such as handling coal, ashes, etc., or for service in places where the use of steam is undesirable for any reason.

The Dreis & Krump Mfg. Company, Chicago, has shipped a carload of steel bending brakes for its exhibit in the Machinery Palace at the Panama-Pacific Exposition. Two cornice brakes, a box and pan forming brake and a power brake with a capacity to handle ⅜-in. plate are included among the products to be shown. The last machine mentioned weighs 36,000 lb. and is operated by a 15-hp. motor. The machines will be shown in operation and will be in charge of H. C. Dreis, president, and E. J. Dreis, secretary of the company.

Austria will be represented by 10,000 sq. ft. of exhibit space at the Panama-Pacific International Exposition. The only nation now in the war that is not participating in the exposition is Russia.

Portable Cylinder Grinding Machine

For truing up the interiors of gas engine cylinders a portable motor-driven machine has been placed on the market by Boxill & Bruel, 112 East Fourth street, Cincinnati, Ohio. The machine is intended to furnish an inexpensive means of repairing the damage done by the piston and piston rings in wearing one-half of the cylinder more than the other in service. It is designed to do the work that was formerly handled by a lathe or boring mill.



A Motor-Driven Portable Machine for Grinding the Cylinders of Internal Combustion Engines

As can be seen from the accompanying illustration, the machine is self-contained and consists of a vertical bar with a circular rack integral with it. A horizontal motor transmits power to rotate the bar and feed it down simultaneously through a train of worms. The feed is entirely automatic, and once it is set and started the machine will operate without any further attention. A sleeve inside the vertical bar contains the grinding spindle and is eccentric with reference to the main bar, an arrangement which permits different sizes of cylinders to be bored. Provision is made for varying the depth of the cut, according to the condition of the cylinder. In the accompanying illustration the machine is operating on a pair of cylinders, and a portion of the one that is being ground is cut away to show the method of grinding. A 1/6-hp. vertical motor is connected by a flexible coupling to the grinding spindle and rotates the grinding wheel at a high rate of speed.

The power for operating the machine is taken from an adjacent light socket. The horizontal motor, which is rated at 1/10 hp., and the vertical motor are both of the universal type, thus enabling either direct or alternating current of the same voltage to be used.

New Machine for Numbering Metal Parts

For stamping consecutive numbers on metal parts, such as keys, locks, revolvers, metal tags, name plates, watches, automobile licenses, etc., the American Numbering Machine Company, 224 Shepherd avenue, Brooklyn, N. Y., has developed a new automatic numbering machine. It is for use also on wood, leather, fiber or any other hard material. It may be applied to a power or lever press, the shank being made to fit the machine with which the numbering machine is to be used.

An Automatic Machine for the Consecutive Numbering of Metal Parts Such As Keys, Locks, Metal Tags, Name Plates, Etc.

A Study of the Malleable Furnace

The Harbison-Walker Refractories Company, Pittsburgh, Pa., has issued a booklet entitled "A Study of the Malleable Furnace," which is the third of the series. While the book throws no new light on the subject covered nor solves some of the vexing problems, it aims to present the vital points in a clear and concise form so that a fair understanding of its principles may be obtained.

The characteristics of malleable iron are first touched upon, followed by the specifications of the American Society for Testing Materials, with a brief description of the general process of manufacture and a discussion of the relative advantages of the various furnaces. The design and operation of the malleable furnace are gone into at some length. Changes occurring in the production of malleable cast iron are explained by photomicrographs and the record of a typical heat is included.

Sturtevant Wins Fan Patent Suit

The patent suit brought against the B. F. Sturtevant Company, Boston, Mass., by the Sirocco Engineering Company, which has been in the courts for the past six years, has just been decided by the United States Circuit Court of Appeals for the second circuit, in favor of the Sturtevant Company. It was claimed that the Sturtevant Multivane fan infringed the Sirocco Company's patents, and in the lower court this claim was sustained. The Court of Appeals, however, reversed the former decision and held that there was no infringement. This court further decided that the Sirocco patents in suit were void in view of the development of the fan-building art prior to the alleged inventions upon which these patents were based. As there are probably more Multivane fans in use than any other make the monetary consideration at stake was large.

At the annual meeting of the Anderson Foundry & Machine Company, Anderson, Ind., William N. Durbin was elected president succeeding Winfield T. Durbin, who had been president several years, and who now becomes chairman of the board of directors. M. C. Norton, Ft. Wayne, was elected vice-president, and J. W. Rose, recently of Martinsville, secretary-treasurer. A dividend of 8 per cent. was declared.

THE PHYSICIAN IN INDUSTRY*

How the Science of Preventive Medicine is Minimizing Accidents

BY DR. SIDNEY M. MC CURDY

There has arisen on the part of good medical thinkers and at the call of an enlightened public, a new medical specialty, the science of preventive medicine. The value of men, women and children in our country is worth in money more than twice as much as are our industries, railroads, land, buildings and improvements. No monetary value can be placed on the health and happiness of humanity.

What has been true of the science of preventive medicine in the past is going to be intensified in the future. Medical sociologists have demonstrated to us the folly of attempting to raise healthy children in the slums. They have shown us the folly of allowing children, our next generation of workers, to reach manhood and womanhood, stunted in knowledge and health by an impossible environment and one that could be controlled.

PHYSICAL EXAMINATION OF EMPLOYEES

In many places we are giving our school children a physical examination in our endeavor to find the early traces of disease, and to correct the disorder before the damage is done. Students of the work find that it pays the community in dollars and cents, because they have discovered that a large percentage of the children, who are repeating years in school at an average cost of $26 a year per child, are not doing so because of dumbness and inability to learn, but on account of physical defects that could be corrected.

Recently a new and powerful force has been introduced, which depends upon medical men for its success, and which will do more to alleviate human suffering and economic loss due to accidents and disease, than any previous methods tried. I refer to the activities of the State to classify its accidents, and to place a premium upon their prevention, to teach the truth about occupational diseases and their prevention and to provide the workingman with a healthy place in which to work. I wish to pay tribute to some industrial organizations for their efforts to aid the State in its work, and to their interest in supplementing that work with an accurate knowledge of the physical condition of its workmen, in order that in so far as it is possible no man shall be allowed to do a kind of work that is unsuitable to his physical condition. The very beginning of disease may then be detected long before serious damage is done. This, to my mind, simply is a continuation of the work done, when the school child is physically examined.

What the State's loss of time is, per accident per man, I do not know, but I have learned from experience that for men so badly hurt that a day or more is necessary, the average of 12 days for all injuries should not be exceeded, if the work is most efficiently done. Diminished numbers of infections, with their increased loss of time, 4 days to 1 of the non-infected cases, their deformities and stiff joints, and sometimes amputated members, test the skill, knowledge and efficiency of the medical men. Infections at the Youngstown Sheet & Tube Company, where I have the honor to be employed, number 1 in 914 for all open wounds when treated at once. The ratio of Ohio as reported by Dr. Binkley, chief medical examiner of the State, is 1 in 10, 50 per cent. due to the neglect of the injured man himself, and the other 50 per cent. to the medical care. Every employer of labor should so organize his forces that care is given the injured man in such a manner as to yield the minimum amount of infections and thus diminish the expense and suffering.

FITNESS OF MEN FOR THEIR WORK

My associate, Dr. Dobbins, and myself, at the plant of the Youngstown Sheet & Tube Company have been engaged for the last nine months in studying the relationship between the physical fitness of men and their working efficiency, as well as the relation of the worker's health to accidents. We feel sure that we see clearly in many cases the relation of poor physical conditions, bodily and mentally, to accidents. The test of such work as this is not how many men we can refuse work or remove from work, but how many it is possible to make physically fit or how many can be placed at work that suits their physical condition.

Under our former system we waited until from physical weakness a man consulted a physician, and was told the cause, while in the meantime he ignorantly exposed to infection his wife, children, and fellow workmen. By repeated examinations we frequently find evidences of incipient tuberculosis, remove the man to a sanatorium for cure, while a cure is possible, stop the possibility of the afflicted infecting his family and fellow workmen, and return him in the shortest time necessary for a cure, to his family, and to society, a useful producer and a non-infecting individual.

Upon the eyesight of all men depends their own and others' safety. I recently examined a motor crane inspector, who had so little vision that he could not count fingers held at arms length. A little advice and a properly fitting pair of glasses made him an efficient and safe man, besides adding to his own comfort and removing his handicap.

It is eminently not fair to ask a heart case to compete for his living with those of sound heart, for sooner or later, the heart case will become incapacitated and become a burden to his family; a public charge maybe; certainly an economic loss. If placed at work suitable to his heart condition, the man may give good service for years. Hernia, or rupture, usually a congenital defect of nature, has been a potent cause of inefficiency as well as a source of physical disease and absolute danger. I have been obliged recently to operate on two men whose herniæ had become strangulated while at work, and required immediate operation to save their lives. It will raise the health and efficiency of men if we place trusses on the suitable cases, and advise operation when it is necessary. Many a man suffers torments from a supposed rheumatism, when in reality he is troubled with flat feet, a condition that if treated with arch supports can be remedied and all suffering removed.

If these methods bring health, happiness and greater safety to the workingman, there is only one way in which the results can be gained, and that is by the frequent examination of all individuals. These same results could be obtained if we would consult our physicians at stated intervals, but we human individuals have not yet learned to spend our money when well, to prevent being sick. Industry is just beginning to learn, and some have learned already, that it is worth more to prevent sickness than to wait until "the horse is stolen."

When the proper intimacy between medical man and employee is established; when men are examined, defects found and advice given as to remedy, then exists the opportunity to tell and educate large masses of people regarding sanitary living, proper ventilation of the home, the truth about the seriousness of diseases and how to care for them, as well as how to protect themselves and others from infections.

*Notes from an address delivered at the Safety Exposition of Ohio held at Columbus, January 15. Dr. McCurdy is chief surgeon of the Youngstown Sheet & Tube Company, Youngstown, Ohio.

Magnesium, which before the war was selling for 5s. to 5s.6d. ($1.22 to $1.34) in England, now brings 40s. ($9.73) per lb. and is very scarce at that. Several firms having government contracts find their supplies nearly exhausted. Germany heretofore produced all the magnesium used in England, but an English product is appearing which is said to be highly satisfactory.

Copper is said to be Japan's most important mineral product. In 1913 the output was 3410 metric tons over the previous record of 61,471 tons in 1912, the values for the two years being $20,716,800 and $20,045,526 respectively. The greater part of the ore mined in Japan is smelted at the mines, exports for 1912 and 1913 being less than $1000.

THREE PROJECTILE MACHINES

Hydraulic Press and Boring and Turning Lathes of the Niles-Bement-Pond Company

The Niles-Bement-Pond Company, 111 Broadway, New York City, has been building a line of machinery for the manufacture of guns, projectiles and small arms for some time. The European War has led to the production of new machines which are designed for the maximum output on this class of work. Among these are a projectile press, a lathe for doing the rough and finish turning on the outside of projectiles and one for boring the interior.

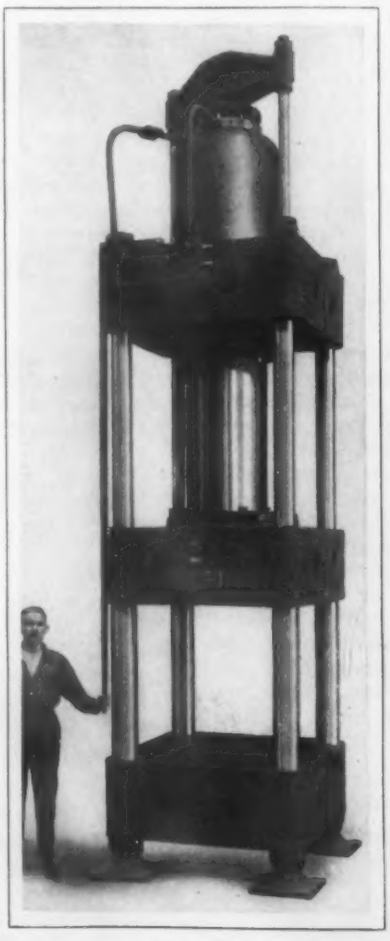
The press is of the four-post inverted-cylinder type, and can be supplied in sizes ranging from 50 to 1000 tons, the 225-ton size being the one illustrated. In this machine the cylinder is located in the top or upper platen, while the piston is attached to the middle one, and the lower platen is stationary, the work being done by the downward stroke of the middle or movable platen. All of these are of heavy box section 54 in. square. The tension bolts, which are steel forgings 5½ in. in diameter, form a guide for the movable platen, the space between the bolts being 37 in. The upper platen supports the main cylinder, which is a separate casting. The plunger is 21⅝ in. in diameter, and is packed with hemp. The stroke of the plunger is 36 in. and with a water pressure of 1500 lb. per sq. in., a downward pressure of 275 tons is exerted.

The drawback cylinder is set in the main plunger, the packing being located at the top, so as to be readily accessible. This plunger bears upon a yoke which is tied to the movable platen by bolts. The drawback plunger exerts a lifting pressure of 50 tons and is located directly above and in line with the center of the main plunger. The maximum distance between the upper surface of the lower platen and the under surface of the working one is 76 in. Steel is used for the cylinders, and the main cylinder has a bronze bushing where it is in contact with the steel plunger. A hydraulic bronze operating valve of the poppet type is provided. The seats are removable and the valve is operated by a hand lever placed in a convenient location for the operator.

The projectile turning lathe is built in two sizes, 20 and 24 in., for handling projectiles having maximum diameters of 8 and 10 in. respectively. The bed is wide and deep with box girder cross ties at frequent intervals and flat tracks. Legs under the bed enable the chips to be cleaned out readily, and bring the spindle center at a hight of 42 in. above the floor, which it is pointed out is very convenient for the operator. A rack is cast in the bed between the tracks near the center to receive the tailstock brace.

The headstock is of heavy design with a long bearing on the bed. A direct-connected 15-hp. motor, having a speed variation of 2 to 1, drives the face plate. Four mechanical speed changes are provided by two levers located on the front of the headstock which are interlocked so that two speeds cannot be engaged at the same time. Speed changes in the controller together with gearing provide 60 face plate speeds ranging from 12 to 350 r. p. m. A drum type controller located at the headstock end of the bed starts, stops and reverses the motor while the work is stopped instantly by a dynamic brake. The pinion driving the main face plate gear is mounted in the headstock so as to eliminate any tendency of the resistance of the cut or of the power applied to the pinion to lift the main spindle in its bearings, and the main spindle caps are relieved of the upward thrust due to the cut. The face plate is removable to permit rapid interchange with the chuck. All the bearings and gears in the headstock are inclosed and are oiled continuously from a tank in the headstock which is kept filled by a gear-driven pump drawing oil from a tank underneath. All the surplus oil drains into this tank and is filtered before being used a second time. The oil supply pipe has a visible feed, and the tank is provided with a gauge showing the level of the oil.

The carriage is fitted with flat tracks bearing the entire width, which tends to make the span for the bridge of the carriage short. Gibs underneath the tracks, both at the front and the back, fasten the carriage to the bed and wipers are provided at each end to keep the bearing surfaces clean. The tool rest, which is of the compound swiveling type, travels in a wide bridge, the length, it is pointed out, being such that the bearing surface will not be uncovered when the maximum diameters are being turned. Hand and power longitudinal cross feeds are provided in either direction for the tool, and the upper slide has a swiveling holder open on one side. The apron is of ribbed box construction, providing support at both ends for the feed gear shafts. The friction for engaging the power feed is of large diameter, and a wide range of feeds is provided, any changes being by a quick change gear mechanism operated by a single handle. If desired, a screw-cutting mechanism can be supplied.



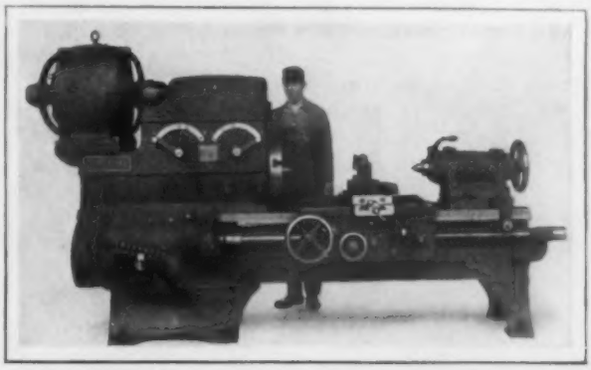
A Hydraulic Press for Drawing the Projectile Shells

The tailstock is of large box section and can be fastened in any position on the bed by four large bolts running to the top and heavy clamps, while a tail brace engaging a rack in the bed furnishes an additional means of preventing the tailstock from slipping under heavy end thrust. The spindle is a large diameter steel forging and a graduated set over for turning small tapers is provided.

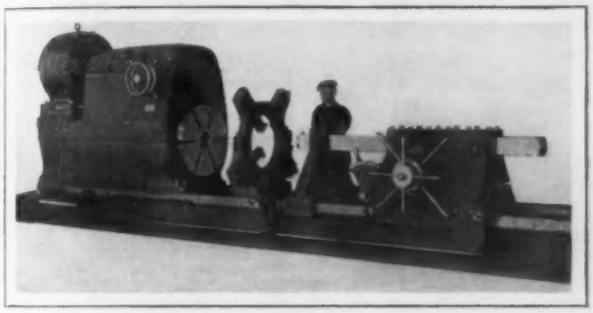
The boring lathe is designed for the rough and finished boring of projectiles ranging from 6 to 14 in. in diameter. Like the turning lathe, the bed has flat tracks and is of large cross-section, with box girder cross ties at frequent intervals and a rack between the tracks for the tail brace pawl.

The headstock is of massive box construction and has a bearing of 89 in. on the bed. The front spindle bearing is 8 in. in diameter and 23 in. long, which serves to give some idea of the size of the headstock. Continu-

ous oiling is supplied for the bearings and gears which are entirely inclosed. The main spindle is driven by a 35-hp, direct-connected adjustable-speed motor mounted on the headstock. Three mechanical speed changes are provided through gearing controlled by convenient handwheels, and in conjunction with the speed variation of the motor about 60 face plate speeds varying from 2½ to 77 r. p. m. are provided. A handle which is adjustably mounted on the bed enables the face plate to be started, stopped or reversed or any of the different motor speeds to be secured without it being necessary for the operator to leave his position at the boring tool. The low speeds of the face plate are obtained by a pinion driving the face plate gear, and the higher ones are secured by driving through the face plate spindle, which, it is pointed out, obviates the necessity of running the face plate pinion at an excessively high speed.



The boring tailstock is fitted with a square boring ram, which is a steel forging of large cross-section. A shaft running from the headstock along the rear of the bed provides the feed for the ram through rack, gear, pinion and worm gear, which are employed to give a smooth motion, large hand spiders regulating the starting, stopping and reversal of the feed. The range of feeds is from 0.005 to 0.030 in. per revolution of the face plate secured in eight steps. Half of these feeds are secured by a positive clutch mechanism without any change of gears, any changes being made by two levers which are located on the front of the tailstock and travel with it, and the remaining feeds are obtained by one change of gears at the headstock end. Continuous feed of not less than 48 in. without resetting the tailstock is provided for the boring bar. A support which slides along the bed is furnished to support the boring ram near the end carrying the tools and is relied upon to prevent vibration. A rigid support for the boring ram is provided by the tailstock which is long and of large cross-section. Large bolts and heavy clamps together with a tail brace are employed to hold the tailstock in position on the bed. The steady rest is designed to handle work from 6 to 20 in. in diameter, and is of box section with four jaws of large cross-section.



Two Lathes for Projectile Work. Above a 20-In. Heavy Duty Tool for Turning the Outside of Shells Ranging from 8 to 10 in. in Diameter and Underneath Front and Rear Views of a Lathe Designed for Boring the Inside of Projectiles from 6 to 14 In. in Diameter

The more zinc there is in brass mixtures, the dirtier the castings when cast in sand. An authority states that if the amount of zinc exceeds 34 per cent. the castings will come out dirty on account of the formation of zinc oxide.

SAFEGUARDING CRANES

Specifications for Crane Wheels and Hoisting Apparatus to Promote Safety

The following stipulations regarding the safeguarding of traveling cranes were contained in a paper read before the second annual Pennsylvania Industrial Welfare and Efficiency Conference, held at Harrisburg, some weeks ago, by H. A. Schultz, chief safety inspector of the American Steel & Wire Company, Pittsburgh.

Overhead traveling cranes should be what are known as all-steel construction. No cast iron should be used except for minor parts, such as drums, bearing brackets, caps, boxes, etc., where strength is not of primary importance. No wood or other combustible material should be used in the construction of cranes.

All bolts should be through type, and no studs or cap screws should be used, unless by a special agreement; bolts should be suitably secured from turning, and equipped with approved lock nuts or lock washers.

For cranes with a capacity of 5 tons or under, bridge track wheels should be not less than 18 in. in diameter; for capacities of over 5 tons, they should be not less than 24 in. in diameter. Trolley wheels should not be less than 12 in. in diameter. All track wheels should preferably be either of rolled open-hearth steel, 0.70 or 0.80 per cent. carbon, or of cast iron or steel bodies, equipped with rolled steel tires shrunk on—no cast treads should be used. The wheels should be accurately finished for diameter and tread required, and the tread should be of sufficient thickness to carry the rated load when wheels have been reduced 1¼ in. in diameter.

Hoists should be equipped with approved steel cables and not chains. Cables should be of plow steel inside and crucible steel outside, or of all plow steel, 6 strands, 37 wires to the strand. For ordinary service, cable with a hemp core can be used, but this should be of soft iron where subject to excessive heat.

The drums should be so designed that there will be not less than two full wraps of hoisting cable in the grooves when the hook is in the lowest position. The pitch diameter of the hoist drums and sheaves should be at least 30 times the diameter of the cable and they should have flanges at each end not less than 1 in. thick and projecting at least 2¾ in. from the body of the drum. The bottom sheaves should be protected by close fitting guards.

Fatalities in coal mines in the United States in 1914 were 334 less than during the preceding year, according to Albert H. Fay, mining engineer of the United States Bureau of Mines, the total fatalities being 2451 as compared with 2785 for 1913.

Future Bright for Eastern Shipyards

Sudden Realization of Shortage in Ships Has Filled Yards with Work—Our Merchant Marine Underrated—Cost of War Vessels

It is seldom that the prospects and hopes of a great industry undergo in two months such a complete change for the better as that which has come to the builders of ships on the Atlantic seaboard. For the following interview which shows the extent of the awakening in the demand for ships and the business which has been done and the excellent prospects for more, *The Iron Age* is indebted to H. L. Aldrich, publisher of International Marine Engineering, 17 Battery place, New York. The statement has been made that every state in the Union profits from the building of a ship and if this is not entirely true it is nearly so and demonstrates the importance of a revival of shipbuilding. Not in 20 years have Eastern shipyards had so much business in hand and in sight as they have now.

For months in the latter part of 1914 not one contract for a ship was placed. In July one was hanging fire, as the Luckenbach Steamship Company was ready to sign a contract for a vessel, but the war broke out and action was deferred. From that time to December 1 not a contract of importance was placed. Then came the realization that there was a great shortage of ships and since early December contracts have been placed for 50 steam vessels, practically all of which go into several thousands of tons dead weight. The following is but a partial résumé of what has taken place since the buyers and builders of ships were stirred into action.

SOME OF THE NOTABLE ORDERS

In December the Newport News Shipbuilding & Dry Dock Company, Newport News, Va., had practically no new work on hand. Since then this company has taken orders for three tank steamships for the Standard Oil Company, two of which are the largest ever undertaken of this type of vessel; also an order for a steamship of considerable size for Crowell & Thurlow, Boston, and a freight steamship of several thousand tons dead weight for the New York & Porto Rico Steamship Company. The Luckenbach Steamship Company placed an order with the Newport News yard for the freighter which was held up at the outbreak of the war. It will be of about 8000 tons dead weight and it will not be surprising if this order is duplicated.

The marine department of the Maryland Steel Company, Sparrows Point, Md., has secured several orders in the past two months, including a duplicate of the Carolyn, for the Bull Steamship Company, New York, and a large freight and passenger steamship for the Munson Line, New York. The American-Hawaiian Steamship Company has placed an order for a duplicate of the Washingtonian which was wrecked at sea, and also has placed an order with the same yard for two somewhat smaller boats to be 389 ft. long and designed especially for carrying lumber. There are rumors that the Sparrows Point yard is about to receive an order for a tank steamship.

The New York Shipbuilding Company, Camden, N. J., has an order for two large freight steamships, each of 8500 tons, for Captain J. G. Crowley, of the Coastwise Transportation Company, Boston. The Camden yard also has a contract for a large dredge for use at Panama, the contract for which was placed by the Bucyrus Company, South Milwaukee, Wis. It is understood that the New York Shipbuilding Company has a contract for an oil tank steamship of about 6000 tons.

The Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia, will undoubtedly receive, if it has not done so already, a contract to build three freight steamships for W. R. Grace & Co., New York, the three vessels to be duplicates of the so-called "Santa" ships.

The Harlan & Hollingsworth Corporation, Wilmington, Del., has booked a contract for an oil tank steamship for the Anglo-Saxon Petroleum Company, London, England, and it is understood that a contract for a duplicate has or soon will be placed with the same yard. This is the first case on record where British owners have come to the United States to have a ship built. The reason for it is that the vessel is to operate under the American flag. Harlan & Hollingsworth also have the contract for a steamer for the bay service of the Baltimore, Chesapeake & Atlantic Railway Company, Baltimore, to replace the steamer Maryland recently burned.

The Fore River Shipbuilding Company, Quincy, Mass., has an order for two large tank steamships for the Texas Company, New York.

In December the United States Navy Department placed orders for torpedo-boat destroyers as follows: Fore River Shipbuilding Company, two; Bath Iron Works, Bath, Me., two; Wm. Cramp & Sons Ship & Engine Building Company, two; Mare Island Navy Yard, one. In the same month the Government placed orders also for eight sub-marines, one of which is to be larger than any ever built in this country, and, according to report, to have a radius of 7000 miles. It is to cost $1,350,000.

MANY INQUIRIES FOR NEW VESSELS

In addition to the merchant ships above mentioned, orders have been placed for a number of tug boats and other steam vessels. Inquiries are out and in some instances plans are completed for 50 to 60 vessels, including several oil tank steamships for the Gulf Refining Company, New York, and one or another of the Standard Oil Companies. The sources from which other inquiries have emanated are not so certain. Captain Crowley, Coastwise Transportation Company, is in the market for three or more steamships and several barges in addition to the two ships contracted for with the New York Shipbuilding Company.

The Ocean Steamship Company, New York, known as the Savannah Line, has inquiries out for two or three large passenger ships and two or three freighters. The New York & Cuba Mail Steamship Company, known as the Ward Line, has sold several of its older ships and has been in the market for several new vessels. In short, almost every steamship company has either ordered ships or considered the building of from one to four.

The most interesting yacht ordered in many years is one to be built by the George Lawley & Sons Corporation, Boston, for Alexander S. Cochran, from plans prepared by William Gardner, at an estimated cost of $750,000. It is to be 150 ft. on

the water line and to have two oil engines for auxiliary power. In the building of the boat the use of high grade alloy steels has been freely specified. The Lawley Corporation also has a contract for a large yacht designed by Tams, Lemoine & Crane, New York.

PACIFIC AND LAKE YARDS QUIET

It will be noticed that all of the orders referred to concern yards on the Atlantic coast. The yards on the Great Lakes have little or no new work and are depending very largely on the regular run of repair work. On the Pacific coast the Union Iron Works, San Francisco, Cal., is just completing an oil tank steamship and has well toward completion a Sacramento river boat. This yard is understood to have closed a contract for a tank steamship. The Seattle Construction & Dry Dock Company has considerable work in hand, but nothing of consequence outside of Government contracts.

At no time in the last twenty years have shipbuilders on the Atlantic coast had as much work on hand as they have at present. Even if the Administration ship purchase bill were to pass Congress, there is no doubt that a great majority of the vessels contemplated will be built, though it is a fact that many contracts are being held up to see what the Government will do.

HIGHER COSTS FOR GOVERNMENT SHIPS

With the orders that shipbuilders have in hand and the certainty that many more orders for merchant vessels will shortly be placed, it is doubtful if the Navy Department will be able to get low prices on the battleships, destroyers and other naval vessels called for by the Navy Bill now before Congress. It may be that some of these vessels will be built in Government yards, but this will mean that the cost will be considerably more than if they were constructed by private concerns, even if the latter advance their previous prices. In connection with the comparative costs of warships built in Government navy yards it is interesting to recall some figures given by Hon. William A. Jones, of Virginia, in a discussion of the naval appropriation bill before Congress in April, 1914. Besides the first cost of several naval vessels, he also went into costs of repairs on them.

In the case of the battleship Connecticut, which was built in the New York Navy Yard, it was shown that the Connecticut cost $374,000 more than a sister ship, the Louisiana, built by contract at the yards of the Newport News Shipbuilding & Dry Dock Company, the cost of repairs on the Connecticut up to March 1, 1914, amounting to $31,000 more than the cost of repairs on the Louisiana up to the same date. Again, in the case of the Florida, which was also built at the New York Navy Yard, the first cost of the ship was $2,269,000 more than that of the Utah, a sister ship, built by contract at the New York Shipbuilding Company. The cost of repairs on the Florida up to March 1, 1914, amounted to $55,000 more than the cost of repairs on the Utah. Still another example for comparison was offered by the battleships New York and Texas. The New York was built in the New York navy yard and cost $1,463,000 more than the Texas, a sister ship built by the Newport News Shipbuilding & Dry Dock Company. Notwithstanding that the total expenditures on the battleship New York up to March 1, 1914, indicate savings of $413,750.50 for the construction of the hull and $245,884.91 for the construction of the machinery as compared with the original estimates for the ship, and that additional amounts above the contract price of the Texas were paid by the Government for extra work on the Texas, nevertheless the Government-built ship New York cost the Government more than a million dollars in excess of the contract-built ship Texas.

OUR MERCHANT MARINE SECOND IN SIZE

When talking of merchant marine matters, most persons seem to think there is practically no merchant marine in the United States. This is true in so far as there are only a limited number of United States ships regularly employed in foreign trade. Our sea coasts, however, call for a large number of vessels and, as we all know, there are many ships on the Great Lakes. It is seldom realized that the American merchant marine is far ahead of that of any nation except that of Great Britain. On July 1, 1914, the merchant marine fleet of Great Britain comprised 21,045,049 gross tons, that of the United States amounted to 7,928,688 gross tons and next came Germany with 5,134,720 gross tons. These figures, of course, have been changed to some degree by the losses of belligerent nations since the war began. Since the passage by Congress, August 18, 1914, of an act admitting vessels to United States registry under certain conditions, considerably over 400,000 gross tons of shipping have come in under the act and are now flying the American flag.

TEST OF ELECTRICAL PROPULSION

An interesting installation tested last year was the electric propulsion apparatus in the navy collier Jupiter. In charge of Lieutenant Robinson this ship has cruised 14,000 miles since she was placed in commission and the new method of drive proved entirely successful. Advocates of this form of propulsion assert that 75 per cent., or more, efficiency can be attained, whereas with direct turbine drive about 63 per cent. is the best accomplished. The test of the Jupiter was not a thorough one, so far as its application to battleships is concerned, for the reason that the collier was designed for economical operation at a single speed, whereas battleships must have variable speed. On a battleship the machinery will consist of two turbo-generators, running at a maximum speed of about 2000 r.p.m., generating current at about 3000 volts and four induction motors of the double squirrel-cage type arranged on four shafts. The stators of the motors will be fitted with pole changers which will give the motors two different numbers of poles and consequently two reductions of speed. Reliability is gained from the fact that the installation is in duplicate and the breaking down of one engine will not affect the ship except at high speeds. With electric drive it will be possible to get the same results, or better, at a cruising speed of, say 12 knots, as at the full speed of 20½ knots, whereas in a direct turbine-driven ship the best economy which is obtained at full speeds cannot be maintained at cruising speeds. A part of the losses in the electrical transmission is regained through the increased efficiency of the slow running propellers. The battleship California is to have the new drive and her performance will be watched with interest by marine engineers and others.

Corrigan, McKinney & Co., Cleveland, Ohio, have issued their 1915 iron-ore analysis book in which are listed 20 Lake Superior ores, 6 of which are Bessemer, including 2 silicious Bessemer ores, and 14 are non-Bessemer ores. No new ores are listed this season, but one that was in the 1914 book—the Armenia, a non-Bessemer red hematite ore in the Menominee range—is omitted, the firm having surrendered the lease of this property. The book is attractive in form, vying in this respect with last year's.

Steel Rails and Blast Furnace Practice

Important Papers on These and Other Subjects Presented and Discussed at the Annual Meeting of the American Institute of Mining Engineers

Steel rails and blast furnace practice and equipment occupied a prominent place in the deliberations of the annual meeting of the American Institute of Mining Engineers in this city, February 15, 16 and 17. The technical sessions of the iron and steel committee of this institute are becoming increasingly important in their bearing on the progress of the industry and in their contributions to the literature and metallurgy of steel and iron. The regular session Monday morning of this week at the Engineering Societies Building added new emphasis to this statement. It was characterized by two valuable papers on the vital question of better steel rails and two on blast furnace operation in general besides others of theoretical and practical interest and value.

Good Rails and Sound Ingots

The rail question was brought before the institute in a paper by W. H. Shimer, Bethlehem Steeel Company, on the "Effect of Finishing Temperatures of Rails on Their Physical Properties and Microstructure" and in one by G. K. Burgess, Bureau of Standards, and Sir R. A. Hadfield on "Sound Steel Ingots and Rails."

FINISHING TEMPERATURES OF RAILS

A large portion of the paper by Mr. Shimer is given in another part of this issue of *The Iron Age* and an abstract of it was presented to the meeting. The object of this paper was to show that, as against the practice of rolling rails direct from ingots, a reheating of the hot blooms or subjecting them to a "wash heat," produces a more ductile and better rail with better physical properties and microstructure. It should be understood that this does not involve allowing the blooms to cool to nearly atmospheric temperature before reheating, a new provision of the recent specifications of the Pennsylvania Railroad. The paper, as far as it goes, is regarded as a valuable contribution to the subject, but it brought out very little discussion which was rather disappointing in view of the recent changes of the railroad referred to.

The Discussion.—William R. Webster, consulting engineer, Philadelphia, expressed the opinion that the subject of the finishing temperature of rails was only started and that the varying sections of metal involved were highly important. He noticed that the physical results in the paper ran as high as 125,000 lb. per sq. in. but he felt that if the metal in the rails could have been rolled into rounds of a diameter equal to the head of the rail, that still better results would follow, showing that adjacent thin sections were important in their effect. In the case of tires it had been his experience that many had failed to meet requirements, evidently because of high temperatures in rolling, but that when rolled much colder the specifications were met.

Prof. Henry M. Howe, of Columbia University, offered the suggestion that possibly the higher manganese content of rails caused a sluggishness of the metal which affected results and conditions, rendering a comparison with other metal difficult.

Dr. G. K. Burgess expressed his appreciation of the paper and his gratification that the experiments had been made. He felt that the variations in microstructure were due to differences in cooling. He called attention to a very recent statement of M. R. Wickhorst, engineer of tests, rail committee, American Railway Engineering Association, that, as a result of late experiments he was able to say that there is some slight evidence that a lower finishing temperature is advantageous.

RAILS FROM SOUND STEEL INGOTS

The question of sound steel ingots and consequently better rails was brought before the meeting in the paper by Dr. Burgess and Sir Robert Hadfield, a large abstract of which appeared in *The Iron Age* of February 11, 1915. It consisted of a comparison of the Hadfield ingot and an ingot poured according to the average American practice in which less segregation and piping resulted from the former, with more homogeneous rails, much less discard and better physical properties. The experiments were made at the Maryland Steel Company. Dr. Burgess read a short abstract of the paper.

Prof. Albert Sauveur of Harvard University, who presided at the meeting and who is chairman of the steel committee of the institute, was earnest in the expression of his thanks to the authors of the paper which he considered only another evidence of the definiteness and finality of the work done by the Bureau of Standards. He spoke of the Bureau's former achievements of this character such as the settlement of the question as to the existence of the critical point, A_2, in carbonless iron; the worthlessness of the shrinkage clause in rail specifications and the question of the practical use of pyrometers in metallurgical research. Dr. Sauveur felt that now it was shown that sound ingots can be made so as to eliminate piping and segregated metal and that we are culpable if we do not use sound ingots and that, though the standpatters claim that the discard removes undesirable parts, unsound ingots should not be tolerated and good practice should become general.

Professor Howe readily echoed the remarks of the chairman as bringing forcibly to the front the ethical question and the prevention of a continuation of peril.

Henry D. Hibbard, consulting engineer, Plainfield, N. J., stated that while Hadfield or other ingots might always be right, it was of prime importance that the steel be made right first.

F. W. Wood, president of the Maryland Steel Company, sent in a written discussion in which he said that while he agreed fully with the Hadfield method, to what extent would rail failures be reduced? All kinds of flaws were not eliminated by such ingots he claimed; that surface flaws, such as seams, and slag inclusions were still possible; that transverse fissures have not been connected with piping or segregation and that they are as numerous from lower ingot rails as from the upper; that any positive relief must be looked for in other directions.

Blast-Furnace Practice

In blast furnace practice and equipment two papers occupied the attention of the meeting, one dealing with blast temperatures and the other with gas-power blower stations.

THE QUESTION OF HIGH BLAST HEATS

"High Blast Heats in Mesaba Practice" was the subject of a contribution by Walther Mathesius, of the Illinois Steel Company, South Chicago, Ill., an abstract of which was presented by W. A. Forbes, of the United States Steel Corporation, in the absence of the author. The paper was an exposition of the successful and economical results obtained in using high blast temperatures in smelting Mesaba ores, the general practice involving operation on very low blast temperatures, varying between 800 and 1000 deg F. It has been shown, says the author, that with proper furnace conditions it is not only possible but profitable in coke economy, to carry high heats on Mesaba furnaces. This being true "the next problem is to generate these heats in the most efficient way and without losing through inefficient stove operation the advantage thus gained. In other words, the problem of adapting furnace lines, raw materials, and operation to new practice having

been proved capable of solution, efficient heat generation through suitable stove construction and operation is of paramount interest to-day." The paper will be given more extended attention in the next issue of *The Iron Age*.

The Discussion.—Comment on the paper was participated in by several metallurgists and furnace men and the opinion was general that the results presented a valuable contribution to this subject. Prof. Joseph W. Richards, Lehigh University, stated that the author had answered the question why it had not been economical to use high blast temperatures as in European practice. Since the paper did not mention any details of difficulties in the blast, he presumed irregularities had been side-tracked.

In reply to this Mr. Forbes remarked that a large part of the troubles in the early days, when large percentages of ores were used, were due to furnace lines; but that with changes in the diameter of the bosh, the bosh angle and the hearth, the difficulties have been largely eliminated in using high percentages of Mesaba ores and high blasts.

J. E. Johnson, Jr., consulting engineer, New York, was of the opinion that the paper could be longer because of its value and importance; that it was really a continuation of the remarkable results with furnace lines presented by the author's chief, William A. Brassert, at the spring meeting of the American Iron and Steel Institute in New York in 1914. Mr. Johnson said that the use of higher heats was due to the decrease in the diameter of the hearth in relation to that of the bosh. Another circumstance that had contributed to success was the remarkable coke used by the company—coke not too hard or too soft, nor too porous or too dense. Mr. Johnson called attention to a feature of the elaborate heat balance statement with which the paper closes—the high value for the total heat of slag and iron, which is larger than that of most authorities. If there was no mistake about this, he felt that many things would be explained that had not been explained thus far, and that his experience tended to corroborate that of the author. In regard to the question of solution loss, which was regarded as a complicated one, Mr. Johnson stated that it can be shown that the less solution loss you can have, the higher the top temperature, though low top temperatures are a sign of a good working furnace according to the old idea. He felt that the paper presented such very rare and valuable data as to be priceless and praised the economy revealed in the operation.

POWER STATIONS USING GAS

In his paper describing "Modern Gas-Power Blowing Stations" which Arthur West, of the Bethlehem Steel Company read from manuscript, present plants in which the blast is supplied by gas engines using furnace gas were described chronologically and by lantern slides. The first one thrown on the screen showed the gas-power station of the Bethlehem Steel Company consisting of 11 engines which handle 5 blast furnaces having a capacity of 450 to 500 tons of iron per day. Two engines supply one furnace, leaving one as a spare. In order there followed views of the station of the Minnesota Steel Company, Duluth, Minn., 5 engines for 2 furnaces; the station of the Maryland Steel Company, Sparrows Point, Md., also 5 engines for 2 furnaces, but arranged diagonally across the room, affording better access to each engine. Views of the Theisen washers at the latter plant were also shown, emphasis being put upon the fact that they are located so as to be directly under the supervision of the chief engineer, eliminating extra guards and danger from gases. Each Theisen washer cleans enough gas for 5 furnaces, affording a spare washer at this installation.

Accurate Measurement of the Air.—An important feature brought out by Mr. West was the one that such plants can be so built as to accurately measure the quantity or weight of air condensed—a determination which is now recognized as important as that of measuring the raw materials that go into the furnace. He made the statement that if electric current could be obtained for nothing, justification could be found in installing the reciprocating gas blower engine so as to measure the air. The Bethlehem Steel Company now has under construction 60,000 hp. of gas engines.

SLIP-BANDS OR TWINS IN MANGANESE STEEL

Any contribution by Prof. Henry M. Howe of Columbia University always adds value to the theoretical literature of metallurgy. "Are the Deformation Lines in Manganese Steel Twins or Slip Bands?" by Mr. Howe and Arthur G. Levy, is no exception to this assertion. Space does not allow a fair recital of the paper's conclusions. It however thoroughly proves that the lines referred to are not twins, as commonly believed, but slip bands, and the authors show how this was settled.

Professor Sauveur in commenting on the abstract of the paper as read by Professor Howe and illustrated by lantern slides, stated that the paper was of practical importance as bearing on recent theories.

The paper, "Structure and Hysteresis Loss in Medium-Carbon Steel," by F. C. Langenberg and R. G. Webber, though printed, was not presented.

MINING MAYARI ORE IN CUBA

The session closed with a highly interesting paper by James F. Kemp, professor of geology, Columbia University, on the "Mayari Iron-Ore Deposits of Cuba." It was geological in nature but presented many important analyses and was illustrated by numerous views of the extensive mining operations in Cuba and moving picture reproductions of actual scenes in handling, nodulizing and shipping the ore.

The papers, announced as submitted in manuscript, were "The Electric Furnace in the Steel Foundry," by W. G. Kranz, vice-president of the National Malleable Castings Company, and one on "Duplexing," by F. Lines, superintendent of the Bessemer and open-hearth departments of the Maryland Steel Company, but no abstracts were read and they will not be publicly available until later.

Safety and Sanitation

The opening session of the institute, Monday morning, was devoted to the subject of "Safety and Sanitation," and was presided over by Arthur Williams, electrical engineer, New York, and conducted under the auspices of the institute's safety and sanitation committee. The paper by Frank H. Kneeland, of the United Engineering & Foundry Company, Pittsburgh, on "Safeguarding the Use of Mining Machinery," brought out the fact that the large majority of serious and fatal accidents are attributable to machinery in the mines rather than to explosions, gas or other causes, peculiar to that industry. The paper was accompanied by lantern views indicating how, in common practice, many essential safeguards are neglected.

In the discussion of this paper the influence of intoxicants was touched upon, and an interesting statement was made by J. Parke Channing, consulting mining engineer, New York, with reference to the experience of a Russian mine operator. At the outbreak of the war the working force at one of the properties of this man was depleted by nearly 60 per cent., and production fell off accordingly. The prohibition of the sale of vodka by the Russian Government followed shortly, and the effect upon the mine production was highly significant. It was noted that production began to increase, and the management, seeking an explanation, inquired whether additional men had been secured. The facts were, that the miners had previously been accustomed to work about four days a week. Cut off from their usual dissipations, they began to work continuously, even to the point of working seven days a week. Finding their output thus increased, the miners asked to be put upon a contract basis. Later they found that working seven days a week could not be continued, and the final outcome was that on a contract basis, six days a week, 50 per cent. of the former complement were responsible for a production increase in tonnage 130 per cent.

SAFETY IN COAL OPERATIONS

In his paper describing the safety methods and organization of the United States Coal & Coke Company,

Howard N. Eavenson, chief engineer of the company, made mention of their plan of bonuses, the payment of which was based upon the accident record. These bonuses are paid to foremen and shift bosses, the working force being divided up, as evenly as possible, in gangs, for the safety of which the shift boss is held responsible. The matter of these bonuses called forth considerable discussion which indicated very clearly that in the experience of every one who had followed such a plan the number not only of fatal and very serious accidents, but of slight injuries, had markedly decreased. The possibilities of such a bonus system are of course not confined to mining operations.

The paper by S. Lefevre, concerning the work of Witherbee-Sherman & Company at Mineville, N. Y., in improving the conditions of housing and sanitation, is a very practical statement of this company's actual experience in the handling of 238 tenements for which sanitary conveniences were installed at a cost of $22 per tenement. Accompanying the paper a moving picture film was presented, illustrating the methods practiced at Mineville in training the men in the observance of safety rules.

The paper, "Enlarging the Worth of the Worker and the Perspective of the Employer," by J. Parke Channing, called attention again to the excellent work which the Young Men's Christian Association is doing through its industrial department in bringing together the undergraduate college student and the men in the shop. The plan is being put into operation in many sections of the country, and consists in the formation of classes for workmen, the instruction being given by undergraduates from various universities. The training of the future engineer in an appreciation and understanding of the workman's condition is considered to be even more important than the instruction of the workman, although that is no small benefit the work is securing.

Election of Officers

The officers elected for the ensuing year are as follows: President, William L. Saunders, president Ingersoll-Rand Company, New York; past presidents, Charles F. Rand, president Spanish-American Iron Company, and Benjamin B. Thayer, president Anaconda Copper Company, both of New York; vice-presidents and directors, Sidney J. Jennings, consulting engineer, New York, and Philip N. Moore, consulting mining engineer, St. Louis, Mo.

Manganese Steel from Manganese Scrap

The manufacture of manganese steel from manganese steel scrap by remelting is not possible on account of the loss of manganese and carbon. A patent (U. S. 1,117,384—November 17, 1914) has been granted to Prof. Henry M. Howe, of Columbia University, New York, which claims to provide a method of manufacturing steel scrap into manganese steel articles whereby the scrap can be economically utilized to produce manganese steel possessing the necessary critical relation between the proportions of carbon, manganese and iron, similar to high grade manganese steel manufactured from raw materials.

The process consists in first melting and mixing the scrap and a manganiferous material, such as ferromanganese, containing carbon in suitable proportions to produce the critical ratio between the carbon and manganese in the mixture with a proper allowance for the changes in the proportions of these elements arising from the reactions incident to melting. The proportions must compensate for the loss of manganese by oxidation and the gain in carbon by absorption from the fuel. The ratio having been established, or approximately so, the mixture is diluted with carbon-free iron until the amounts of carbon and manganese bear to the whole the desired relation in per cent. These steps are supplemented by one or more additional operations or treatments adapted to adjust the carbon and manganese with greater precision.

The inventor conducts the melting preferably in a cupola made relatively narrow in its internal dimensions by heavy boshing and having a relatively deep hearth. To make a 12 per cent. manganese steel containing about 1.2 per cent. carbon, one part of 80 per cent. ferromanganese and one part of manganese steel scrap are melted as described and then diluted with four parts of blown metal. To make 8 per cent. manganese steel, the proportions recommended are one part of ferromanganese with two parts of manganese steel scrap, diluted with six parts of blown metal. The final adjustment of proportions may be made in an open hearth furnace.

Strength of Copper at High Temperatures

The strength of copper at high temperatures was the subject of a paper by Dr. G. D. Bengough and D. Hanson at the fall meeting of the Institute of Metals at Portsmouth, England, in September. The results of their investigation showed that the nature of the atmosphere was an important factor, an oxidizing one at a high temperature giving a high degree of ductility to copper. In a neutral atmosphere pure unannealed rolled copper retains all its superior strength over annealed copper at all temperatures from 20 to 1000 deg. C. With pure annealed copper, fracture takes place through all crystals at all temperatures below 700 deg. C., while above 750 deg. C. it passes between the crystals with either possible course at intermediate temperatures. A range of low ductility was discovered at temperatures about 250 to 450 deg. C. While small amounts of oxygen and arsenic decrease the tensile strength at high temperatures, increased ductility was observed. In hydrogen above 720 deg. C. the tensile strength was about a half ton per square inch lower than in a neutral or oxidizing atmosphere. As a whole the results of the tensile tests are consistent with the theory that the crystals of copper are enveloped in a cement which at low temperatures is stronger than the crystals themselves.

Titanium and the Magnetic Properties of Iron

The effect of titanium on the magnetic properties of iron is discussed by K. P. Applegate in the Rensselaer Polytechnic Institute Engineering and Science Series, No. 5, 1914. Iron is rendered magnetically softer by annealing or by the addition of foreign material so as to reduce hysteresis. Silicon and aluminum have been found efficacious. Some of the effects of titanium are: A decrease in hysteresis and an increase in permeability were obtained when less than 1 per cent. of it was used, an increase in hysteresis resulting when more was added. Prolonged annealing at 760 deg. C. fails to soften the material. The pure metal must be used, as commercial titanium alloys cause deterioration in quality. The author says that titanium steels are not so good as the present standard silicon steels.

Hardening or Welding Copper

An invention (U. S. 1,122,062—December 22, 1914,) is announced by Charles Bittner, Stafford, Kansas, for a process of hardening and welding copper. It is said to provide a simple, reliable and efficient method, together with a compound, by which the metal can be quickly hardened, or rapidly welded while being hardened, so as to make a strong union. A composition of acidified hyposulphite of soda is used, made up of hyposulphite and sulphite of soda with acetic acid and alum. The powdered composition is successively applied to various portions of the copper to be treated and at a low heat. The operation is repeated, at which stage the metal is soft enough to be hammered or welded into the shape desired. Copper so treated, it is claimed, will take an edge and be sufficiently hardened for cutting purposes without any tempering.

Bridge and Other Structural Contracts

At the monthly meeting of the Bridge Builders & Structural Society, held in Chicago on February 11, it was shown from the reports collected by Secretary George E. Gifford that in the month of January 25 per cent. of the entire capacity of the bridge and structural shops of the country was contracted for.

FOREIGN IRON TRADE IN 1914

Export and Import Values Decline—December Tonnage Imports Smallest in Years

According to the December report of the Bureau of Foreign and Domestic Commerce the total value of exports of iron and steel and the manufactures thereof, not including ore, for the year 1914 was $199,861,684 as compared with $293,934,160 in 1913. Probably the most interesting feature of the report is the marked decline in the tonnage imports in December, which were only 9046 gross tons against 26,454 tons in the corresponding month of 1913. This figure marks the lowest point reached in several years by these imports. As was the case in November the value of the exports declined, the figure being $14,939,613, or approximately 95.3 per cent. of the value of such exports in November and 67.6 per cent. of the total value for December, 1913. The value of these exports was $15,689,401 in November, $16,445,832 in October and $22,115,701 in December, 1913. The value of iron and steel and manufactures thereof imported in December, 1914, was $1,510,678 as compared with $2,157,450 in November and $2,814,774 in December, 1913.

The exports for which quantities are given fell off as compared with the corresponding month of 1913. There was a steady increase from 41.3 per cent. in August to 79.8 per cent. in November of the quantities exported in the corresponding months of 1913, but in December this figure declined to 63.3 per cent. The aggregate of the tonnage exports was 116,816 gross tons in December compared with 140,752 tons in November, 147,293 tons in October and 181,717 tons in December, 1913. In spite of this decrease steel bars, bolts and nuts, horseshoes and cut nails increased as compared with the previous month and the corresponding month of last year. Tin and terne plates declined to 3977 gross tons from 4837 tons in November, this being the first month since July when this commodity was not exported in greater volume than the preceding month or the corresponding month of the previous year. As compared with December, 1913, however, this commodity shows an increase of approximately 1600 tons. The total value of iron and steel exports for which tonnages are given was $4,980,907 in December, 1914, as compared with $5,782,134 in November and $7,170,222 in December, 1913. The average value per ton of these exports was $42.64 against $41.08 in November and $39.46 in December, 1913.

Details of the exports of these tonnage commodities in December and the 12 months ended with December compared with the corresponding periods of the previous calendar year are as follows:

Exports of Iron and Steel

	December		Twelve months	
	1914 Gross tons	1913 Gross tons	1914 Gross tons	1913 Gross tons
Pig iron	6,746	25,440	114,423	277,648
Scrap	1,511	7,689	33,134	97,429
Bar iron	384	652	5,226	1,662
Wire rods	7,435	7,451	61,856	61,633
Steel bars	22,002	14,912	114,079	211,716
Billets, ingots and blooms, n.e.s.	3,430	2,232	50,496	91,847
Bolts and nuts	1,055	1,886	15,127	22,737
Hoops and bands	706	1,442	9,954	16,736
Horseshoes	1,687	114	5,903	1,247
Cut nails	133	387	3,423	3,790
Railroad spikes	168	580	6,937	11,328
Wire nails	3,785	3,063	36,079	43,637
All other nails, including tacks	306	359	3,182	3,969
Pipes and fittings	.....	21,699	*104,487	301,701
Cast pipes and fittings	3,104	.....	†38,418	.....
Wrought pipes and fittings	8,565	.....	†56,717	.....
Radiators and cast-iron house heating boilers	272	490	3,572	8,064
Steel rails	3,567	22,518	174,680	460,553
Galvanized-iron sheets and plates	3,091	3,799	40,462	77,210
All other iron sheets and plates	203	196	7,555	21,767
Steel plates	6,810	12,872	111,642	223,814
Steel sheets	7,228	10,072	120,436	140,634
Structural iron and steel	10,758	24,754	182,395	403,264
Tin and terne plates	3,977	2,391	59,549	57,812
Barb wire	8,306	7,863	93,820	82,051
All other wire	11,582	8,856	87,022	108,234
Totals	116,816	181,717	1,540,574	2,730,483

*Figure is for six months, January to June, inclusive.
†Figures cover period since June 30.

Export tonnages for each month in 1914 are as follows:

Months	Gross tons	Months	Gross tons
January	118,768	July	114,790
February	121,198	August	86,598
March	159,999	September	96,482
April	161,953	October	147,293
May	139,110	November	140,752
June	143,953	December	116,816

The monthly totals of tonnage imports in 1914 are as follows:

Months	Gross tons	Months	Gross tons
January	17,837	July	24,958
February	14,308	August	28,572
March	27,829	September	38,420
April	30,594	October	22,754
May	28,170	November	24,165
June	23,075	December	9,046

In December the imports of commodities for which quantities are given totaled 9046 gross tons as compared with 24,165 tons in November, 22,754 tons in October and 26,454 tons in December, 1913. All of the commodities declined with the exception of ferrosilicon, the most noticeable ones being structural iron and steel which fell off from 1041 gross tons in December, 1913, to only 94 tons in December, 1914, while the November imports were almost three times as large in 1914 as in the previous year, and tin and terne plates which decreased to 231 gross tons from 4741 tons in 1913. The average value per gross ton of the iron and steel and the manufactures thereof imported in December, 1914, was $53.80, which compared with $39.74 in November and $51.06 in December, 1913.

Details of the imports of tonnage commodities in December and the 12 months ended with December, as compared with the corresponding periods of the previous calendar year, are as follows:

Imports of Iron and Steel

	December		Twelve months	
	1914 Gross tons	1913 Gross tons	1914 Gross tons	1913 Gross tons
Pig iron (including ferrosilicon)	.....	.....	.....	*120,612
Ferrosilicon	304	276	6,146	†900
All other pig iron	3,374	12,173	132,757	†34,938
Scrap	2,096	1,313	34,849	44,154
Bar iron	1,153	1,328	16,414	28,243
Structural iron and steel	94	1,041	10,145	11,213
Hoop or band iron	....	.....	‡648	.....
Ingots, blooms and steel billets	.....	.....	.....	*17,319
Steel billets without alloys	250	542	2,099	†2,173
All other steel billets	1,145	2,267	38,089	†6,737
Steel rails	251	1,642	22,571	10,408
Sheets and plates	69	191	4,310	2,893
Tin and terne plates	231	4,741	15,411	20,680
Wire rods	79	940	6,954	16,098
Totals	9,046	26,454	290,393	316,368

*Figures cover period January 1 to October 3, inclusive.
†Figures cover period beginning October 4.
‡Figures cover period beginning July 1.

Imports of iron ore in December amounted to 51,053 gross tons as compared with 90,222 tons in November, 114,341 tons in October and 223,892 tons in December, 1913. For the 12 months ended with December 1,351,368 tons was imported against 2,594,770 tons for 1913.

Imports of Ferromanganese and Manganese Ore Decreasing

Manganese-ore imports into the United States for the first 9 months of 1914, according to D. F. Hewett, of the United States Geological Survey, were 42,550 tons, or 16 per cent. less than for the corresponding period of 1913. Imports of ferromanganese were 37,420 tons to October 1, 1914, or 37 per cent. less than in the same months of 1913. The shutting off of supplies of the ore from the ports of Boti and Batum on the Black Sea in Russia by Turkey's entrance into the war in October, and the British embargo on shipments from India render it highly likely that receipts of ore during the last three months of last year were decidedly less than in the last quarter of 1913. It is estimated that the imports of manganese ore for 1914 were probably 25 per cent. less than in 1913, and of ferromanganese at least 40 per cent. less. A long continuance of the war and a decided expansion in the steel industry in this country raises the question whether a serious phase will be given to the manganese question.

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The Steel Industry's Operating Rate

The steel trade has lately become confirmed in a habit of estimating its current operations in terms of percentages of capacity, when really it has no means of knowing precisely what its capacity is. Last December, for instance, it was a commonly accepted statement that the steel mills were operating at less than 35 per cent. of capacity, or say at one-third of capacity. Anent those statements two questions arise, whether the actual physical capacity was sufficient to produce neither more nor less than three times the actual output of that month, and whether it would be commercially possible, on short notice, to triple the actual tonnage output of the mills.

The production of Bessemer and basic pig iron and spiegeleisen and ferromanganese on the one hand, and of rolled steel and steel castings on the other, are approximately equal. Combining the statistics of 1912 and 1913 and thus using figures involving totals of nearly 50,000,000 tons, there is an excess in the pig iron produced, not in the steel, but the excess is only 450,446 gross tons for the two years, or a trifle less than one per cent. This means that the amount of old material used did not altogether make up for the scale and other losses, apart from usable scrap, in the conversion of pig iron into steel castings or into rolled merchantable steel.

The steel works are, therefore, dependent upon the blast furnaces. The blast furnaces must depend upon the coke works and the ore mines. The steel works must have finishing capacity, and such an excess in finishing capacity, over steel-making capacity, as will take care of variations in relative market demand for the different products. These are all links in a chain, the strengeth of which is that of the weakest link. All the branches, moreover, must be adequately supplied with labor and with transportation facilities. It is natural, therefore, that if the iron and steel industry is not put to the test for a period of a few years its various branches are likely to grow out of line with one another, and when a test eventually does come the output of merchantable material will be in relation to the capacity of the weakest link.

While no one knows what is the capacity of the industry as a whole, the works manager does not even know precisely the capacity of his individual works. He is unhappy, indeed, if in a time of heavy demand he does not at frequent intervals break all previous records for production.

The maximum rate of pig-iron production was reached two years ago when *The Iron Age* report showed that pig iron was produced in February, 1913, at an average rate of 92,369 tons by the coke and anthracite furnaces. Allowing 350,000 tons a year for the charcoal furnaces, this was at a rate of 34,165,000 gross tons a year. The perperformance was far below the theoretical capacity, for our report showed, for March 1, 1913, 303 coke and anthracite stacks in blast and 117 out of blast, a proportion of 72 per cent. in blast. Some furnaces were out of blast for relining and other repairs, but the proportion involuntarily out could not have been large, seeing that there had been a dull period not long before. The pig-iron market was $4 a ton higher than the level of the past few months, and steel billets were quoted $10 a ton higher than at present. Upon what possible grounds can it be assumed that the commercial capacity of the country, in terms of production continued over a period of say two years, was materially larger than the actual output at that time?

Since that time very few new blast furnaces have been built, and only a relatively small number have been rebuilt. Additions thus made to capacity hardly exceed a million tons annually, while some furnaces, doubtless unfit for many years, have been definitely abandoned. There is scarcely any ground for assuming, therefore, that the United States could make more than 35,000,000 tons of pig iron a year at this time, even though prices were several dollars a ton above those now ruling.

At the time that pig-iron production reached its maximum the steel works were operating practically at full capacity. Some were making new records and thus doing better than the capacity ratings that should have hitherto been given them. Others were running at a few per cent. below their ratings. The record of new construction of open-hearth plants, however, is altogether different from that of blast furnaces. Our annual summaries have shown 2,920,000 tons of open-hearth capacity added in 1913, 1,215,000 tons added in 1914 and 1,750,000 tons under construction at the beginning of this year, making the impressive total of 5,885,000 tons. How are these furnaces to be fed, when in the past the production of merchantable steel has been within 1 per cent. of the production of steel-making pig iron? The situation will be mitigated very materially by one influence, that a portion of the open-hearth capacity added is virtually in replacement of Bessemer capacity, but that is by no means the case with all of it, for prior to this addition we were

making only about 10,000,000 tons of Bessemer steel a year and the demand for Bessemer steel has not decreased so rapidly that it is necessary in two years to cut the production in half. For many finished steel products, including pipe, wire and tin plate, for instance, Bessemer steel is still the predominant material.

With a sufficiently increased demand to make the test it would appear, therefore, as if the pig-iron making capacity would be found insufficient before the steel-making capacity became fully engaged. But the blast furnaces must in turn obtain their raw materials. Some of them have lately gone out of blast after working up all their ore. While there has been much building of by-product coking capacity, there has been practically none in the beehive branch, and at many of the beehive plants the coal has been partially or wholly worked out of late. Thus it is a distinct possibility that not enough coke could be made to supply all the blast furnaces. At the other end of the chain weak links might easily be developed also. The tin-plate and wire mills, for instance, might be incapable of filling the demand for their products when plate and rail mills were operating at far less than capacity.

As to all these branches of the industry there is the possibility of labor shortage. In recent months the unemployment of labor, serious as it has been, has been much less than the unemployment of plant facilities, and there are good grounds for suspecting that the available supply of labor is insufficient for the full operation of the industry. In the past immigration has always risen sharply as the steel industry moved up toward operating at capacity, but that adjustment cannot occur at this time.

One practical application of these observations is that the market may respond more quickly, in prices, to an expanding demand for iron and steel products than is now assumed in most quarters. It is traditional that steel prices do not experience really important advances until the mills are operating at very nearly their full capacity, but it is certain that the danger line should in present circumstances be set much lower, in percentage of assumed capacity, than in the past. Buyers are particularly bare of stocks and thus there is room for a very sudden increase in demand upon the appearance of any danger signals. Apart from misalignment of the different branches of the iron and steel industry and the possible shortage of labor, there is serious danger of the ferromanganese supply proving insufficient. It is a time when it is good counsel to the buyer to cover and good counsel to the seller to make sure of his ground before selling.

British Exporters and American Goods

British exporters have begun to purchase American goods for shipment to the colonies of the Empire and to other parts of the world where the English merchant has established trade. In many of these places American products are, comparatively speaking, little known. It is certain that some luxuries and semi-necessities which are not easily to be purchased in Great Britain and other European countries because of the industrial disorganization resulting from the war, have been sent to England for distribution by the shipping houses. It is easy to believe that as stocks of manufactured goods in the belligerent countries get smaller, the foreign exporter, with continued war, will come to depend more and more upon the United States, particularly for the classes of manufactured articles and materials which enter into the every-day life of men and women the world over.

If the new demand from England for American goods flourishes, the products of the United States will be introduced into more or less unfamiliar places under auspicious circumstances. They should be first rate goods, the best of their kind at the price. Once the acquaintance is made, demand should continue. With a very great number of the products of American factories all that is needed to acquire a market is to introduce the goods. No better way could be found than under the favor of foreigners. But keen and tactful following up is needed.

Advances in Galvanized Steel Products

Selling practices in the metal and steel trade respectively differ so greatly that the phenomenal advance in spelter in the past few weeks has upset the market for galvanized sheet products more than can be accounted for by the mere advance in the selling price of spelter, great as that has been. In a general way, there is no such thing as cancelling a metal purchase, and the New York Metal Exchange has even gone farther, with its present contract, by providing that a sale of metal can be cancelled by the seller giving his check to the buyer for the theoretical loss.

When a sale of spelter is made to a pipe works or a sheet mill, the sale holds good, irrespective of market advances or declines, but the seller of the galvanized steel product, by trade custom, makes contracts and permits the buyer to specify more or less according to his desire. In the sheet trade the giving of so-called "option contracts" became so outrageously one-sided that the practice has been reduced, but it still remains that the keen buyer can place a line of contracts with a number of mills assuring him a greater supply than he can possibly require, yet placing him under no obligation to specify.

With spelter advancing sharply in the past few weeks, and hard to buy at any price, the producer of galvanized sheets has been held by hard lines. He had not bought enough spelter to cover the maximum of his contract obligations and is being called upon to deliver more than he expected. It is easy to say he should have covered on spelter as it advanced, but if the spelter market had broken he would have been caught with too much spelter and not enough specifications for the delivery of sheets. With spelter as it has been the past ten days, moving a quarter of a cent or more overnight sometimes, it has been out of the question to sell galvanized sheets for forward delivery under the usual form of contract, for there was great danger of loss if spelter were bought to cover the contract, and equally great danger of loss if spelter were not bought.

The mills have accordingly followed the policy of selling only for immediate specification and early shipment, and late last week they advanced prices

on galvanized sheets to a basis of 3.25 cents for No. 28 gauge. This is the highest quotation since August, 1913, but that comparison does not tell the tale, for at that time black sheets were $8 a ton higher than at present. The spread between black and galvanized sheets is now $1.45 per hundred pounds and this is by far the largest spread in modern times, in keeping with the fact that at the end of January spelter broke its previous high record of 7.50 cents, East St. Louis, made in September, 1912.

An unfortunate feature of the situation in the past few weeks has been that the sheet mills have found their own customers as competitors in the open market. This is no new experience for them, by any means, but the situation was particularly marked this time. At a time when the mills as a whole found it impossible, on account of the advance in spelter, to make sheets at a certain price they found middle interests quoting below that level, and for the very good reason that the sheet mills owed them sheets on old contracts at still lower prices. One of the sheet mills itself bought sheets heavily from middle interests in the early stages of the advance and is in line to make a good profit by having done so, although it is quite likely some of the sheets it bought were its own.

Panama-Pacific Exposition Opening

Saturday of this week will bring the formal opening of the Panama-Pacific Exposition at San Francisco. For many months, the reality of the exposition has been so impressed upon us, through the agency of an effective publicity, that some of the distinction attaching to the opening date has been lost. The occasion, however, is one of national importance. In the name which is chosen for this international exposition of what the world is doing and producing, importance has been borrowed from that achievement which opens up a new era, not alone in transportation, but in the internal relations of our own country, as affecting the East and the West.

Such an exposition as the one at San Francisco, like those, also, which have preceded it, serves as a milestone, to mark the progress of industry in all its branches throughout the world. The degree in which this progress is portrayed accurately and completely measures the real value of the effort. For the millions of laymen who will visit the Exposition, the exhibits will create the only impressions they are likely to obtain, possibly in a lifetime, of much of the world's activity outside of their ordinary lives. But of peculiar significance to industry in the United States is the fact that the future, whose inauguration is marked by this event, holds in store a new alignment of the commercial relations between our eastern and western coasts, a new adjustment of our affairs, in keeping with the closer relations unquestionably to be set up in the coming decade.

An order for 100 locomotives has been received by the Baldwin Locomotive Works from the French Government. The Cleveland, Cincinnati, Chicago & St. Louis has increased its order of 10 switching engines from the American Locomotive Company to 13, and the Servian Government has ordered from the same builder 10 Mallet locomotives in addition to the 7 ordered late in January.

MELTING CAST IRON BORINGS

Discussion at the February Meeting of the Chicago Foundrymen's Club

The practice of a number of Chicago foundries in the handling of cast-iron borings for melting in the cupola, discussed in impromptu fashion at the January meeting of the Chicago Foundrymen's Club, became at the last meeting, held Saturday evening, February 13, at the New Morrison Hotel, the principal topic. Concerning the experience of Crane Company, it was stated, that the cost of preparing briquettes was the determining factor. With that reasonably low, the use of borings, they had found to be as feasible as any other grade of scrap. At the Deering Works of the International Harvester Company borings have been melted for a number of years, the method being to pack the borings in stove pipes with the bottom closed in, covering the borings with a steel disc, and hammering over the top edge of the pipe so as to seal it up. They found the cost of doing this was $1.40 a ton.

M. J. O'Connor stated that at the old Fraser & Chalmers' plant a considerable experience was had in handling borings, and it was the practice there to occasionally make a heat of borings exclusively. They found that by packing them in boxes, nail kegs, etc., they could melt them down with a loss of about 25 per cent. They were poured into pigs and piled in the yard, just as other stock, and were then analyzed and used very satisfactorily on certain classes of work in place of No. 6 charcoal iron. Allowing $4 a ton as the market price of cast borings, they found that these pigs cost them, when piled up in the yard, $11 a ton. Other experiences were recounted, among them a plan for disposing of several hundred tons of borings by binding them together with a sort of cement, ramming them by hand labor into cast iron ingots or boxes, turning them out on a plank to dry for a day and then piling them up in the yard, using about 15 per cent. of them with the regular charges of iron.

Award of E. H. Harriman Memorial Gold Medal

The New York Central Railroad was recently awarded the E. H. Harriman Memorial Gold Medal for the American steam railroad making the best record in accident prevention and industrial hygiene affecting the public and its own personnel during the year ended June 30, 1914, by the American Museum of Safety. The award was made for the record on the New York Central & Hudson River Railroad prior to its consolidation with the Lake Shore, and in making the award the progressive steps taken in the installation of block signals, improved roadbed, steel equipment and modern safety devices were considered, as well as the actual record of accidents. In the past four years not a passenger has been killed in a train accident on the road, although during that time nearly three million freight and passenger trains were operated, and the number of passengers actually carried equals approximately twice the population of the United States.

One of the interesting features in the road's record is in the efficiency of its employees, as indicated by surprise tests, wherein the employees without previous warning were tested as to their observance of signals set against them, as to flagging, blowing whistles at grade crossings, speed restrictions, etc. In only 389 cases out of the 323 892 tests made in the year were employees deficient, the percentage of efficiency being 99.88 per cent. As a result of the work conducted by the road through its safety bureau, in educating its employees and the public in general to avoid unsafe practices, substantial reductions were made in the number of accidents to passengers and to trespassers and to persons on grade crossings, as well as passengers and employees.

The Appleton Mfg. Company, Batavia, Ill., manufacturer of agricultural implements, has appointed C. K. Turner & Son, 116 Broad street, to act as its New York export trade solicitors.

Uniform Workmen's Compensation Laws

A list of suggestions has been compiled by the workmen's compensation department of the National Civic Federation on what should constitute the provisions of an adequate workmen's compensation law. These suggestions, intended for recommendation to State legislatures, are in part as follows:

The act should be of universal application to all employments, except, of course, those which are exclusively controlled by the federal law.

Injuries covered should exclude injuries occasioned to the employee by the willful intention of such employee to injure himself or another; injuries resulting solely from intoxication of the injured employee, and casual employments.

The statute should secure payment of compensation, and hence provide for compulsory insurance, but all responsible and authorized methods of insurance should be preserved, including self-insurance under proper provisions.

Where state insurance is provided for, the administration of the insurance fund should be in a separate department from the board which administers the compensation law.

Compensation should be based upon the average earnings of the workman in the grade in which employed when injured. A definite percentage of the loss of earnings should be paid periodically in compensation for injuries and death.

The percentages in the case of death benefits should be based upon the number and relationship or extent of dependency of the next of kin, it being preferable, under ordinary circumstances, to fix definite percentages for those relatives who may reasonably be presumed to be dependent, rather than to leave open the question of dependency. All questions as to beneficiaries and dependency to be determined as of the date of accident. A minimum percentage should be paid where there is one dependent, and an appropriate percentage added for each additional dependent up to the maximum percentage allowed. A distinction should be made between allowances to persons partially dependent and those wholly dependent.

There should be a limit in time over which payments are to be made to beneficiaries. Certain contingencies should be covered under which payments will cease, such as remarriage of widows, death of beneficiaries and lapse of time. A reasonable allowance should be made for funeral expenses.

No compensation in injury benefits should be paid for the first two weeks of disability. Provision should be made whereby the employer shall be required to furnish all medical and surgical aid and assistance to the injured employee that may be reasonably required, for a reasonable period of time, but subject to such conditions and regulations as may be best calculated to guard this liability from abuse.

Some inducement should be given to employers to re-employ injured men, especially where the law provides for the payment of compensation for definite periods of time.

The proposed act should include the following provisions: Right of physical examination of injured employee by employer or his agents; commission to have the right to modify awards with changing conditions; compensation unassignable and exempt from claim creditors; regulation of attorney's liens and fees.

The suit brought by the Neal Machinery Company, 50 Church street, New York City, against the Hendey Machine Company, of Torrington, Conn., was decided to-day, in the Supreme Court of New York County, in favor of the Hendey Machine Company. It is stated that the Neal Machinery Company sought to recover for commissions, claimed by them on the sale of 68 Lincoln milling machines to the Remington Arms Company, Ilion, N. Y., last September. The milling machine order was originally sent through Manning, Maxwell & Moore, New York City, just after their selling connection with the Hendey Machine Company had ceased, but later was turned over to the New York City representative of the Hendey Machine Company.

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Youngstown Sheet & Tube Company Report

Stockholders of the Youngstown Sheet & Tube Company met in Youngstown, Ohio, last week and the report of operations and earnings for the year ended December 31, 1914, was made by James A. Campbell president. It is stated that in spite of the very low prices ruling on steel products in the last half of 1914, and the light rate of operations, the company was able to show a profit for the six months ended December 31, large enough to pay dividends of 7 per cent. on the preferred stock and 8 per cent. on the common and provide for depreciation charges, interest charges on its bonds and on the short-term notes it issued a short time ago to pay for extensive coal holdings in Pennsylvania. About $300,000 was expended during the six months for improvements. During the year ended June 30, 1914, a bonus of 3 per cent. of their earnings for the previous year was paid the company's employees. The company's business has improved greatly since the first of the year, January tonnage exceeding that of December by about 25 per cent., while its increase over November was fully 60 per cent. This company contemplates the building of a large number of by-product coke ovens, also more finishing mills at Youngstown, but work on these additions will not start until the steel trade is better. It has no important additions or betterments under way at the present time.

The Iron and Metal Markets

GALVANIZED PRODUCTS UP

Spelter Lifts Pipe and Sheet Prices

General Business Being Sustained in Spite of Low Railroad Demands

Tendencies in the next few weeks in finished steel prices will have an important bearing on betterment in general. The creeping improvement in volume is being sustained and in spite of the small part contributed by the railroads, and, in fact, because of it, the trade is optimistic of the future. It seems clear that the higher prices being asked for new orders of steel for the next few months will be strongly held. The usual argument may be advanced that not enough can be attracted by price declines; and it is believed that should a break occur, prices will go below those of last December. A stabilizing influence is that contracts were driven in at current prices for the second quarter prior to the late advances. This is not to say that the structural market for one thing is yet strong or that lower than ruling prices are not made to-day for plates, but these are not apparently of sufficient influence to affect the general status.

The spectacular event has been the rise in prices of galvanized steel and iron pipe of $6 and $4 a ton respectively and in galvanized sheets of $5, because of the exceptionally high price of spelter, zinc blende in Missouri having reached a record price. There is a growing feeling that scarcity rather than manipulation explains the spelter prices, and the prices for the galvanized products are therefore likely to hold. The wage question in some sheet and tin-plate plants is not yet settled, and meanwhile part of these mills have shut down, but with stocks on hand to take care of demand for some time.

Uneasiness is again developing over the supplies of ferromanganese. The volume of stocks is indefinite as is also the possibility of domestic selling of the alloy. Meanwhile it has developed that holders of English contracts at ante-bellum prices of $38 are being approached with the suggestion that embargoes may possibly be lifted if current prices of $68 are paid for the shipments, thus protecting the sellers against the high ocean freights. The estimated importation of the alloy in 1914 was 40 per cent. less than in 1913, and 25 per cent. less of the manganese ore came to this country in 1914 than in 1913. In fact much of the reduction of importations in iron and steel products in December is due to smaller shipments of ferromanganese.

The pig-iron business has not enjoyed any large sales, but it is looking upward and not a little encouragement is taken among merchant furnaces in the decided improvement in machinery building circles. The last few weeks has seen a growing demand for machinery independent of the larger buying attributable to the war account.

Foreign business continues. Besides the sale of billets noted in our cable report this week, other business in billets has been done with Scotland at profitable prices to the mills. Where the shipments are not large, no great difficulty is met in securing bottoms.

The structural market has passed through a lean week. Much of the business being figured is for public buildings, municipal railroads and other projects paid for directly by the taxpayer, but circumstantial and confident reports are coming in regarding private enterprises which will soon come before the trade. The report of the Bridge Builders and Structural Society shows how much an improvement in the fabricating line is desired, the business written in January amounting to no more than 25 per cent. of the capacity of the fabricating shops. In this connection it is interesting that for the six months prior to August 1 contracts taken averaged monthly 68 per cent. of the capacity of the bridge and other fabricating shops, while for the six months since the war the average has been only 30 per cent. March will probably be dull in this line and not much is expected of the railroads. The largest new offering is for 7500 tons for widening elevated railroads in Brooklyn.

The advance in railroad freight rates of 5 per cent. to go into effect on February 23 is causing no stir, and all interests are merely recognizing the fact.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Feb. 17, 1915.	Feb. 10, 1915.	Jan. 20, 1915.	Feb. 18, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	$14.25	$14.25	$14.25	$15.00
No. 2, Valley furnace....	13.00	13.00	13.00	13.25
No. 2 Southern, Cin'ti...	12.40	12.40	12.40	13.75
No. 2, Birmingham, Ala..	9.50	9.50	9.50	10.50
No. 2, furnace, Chicago*.	13.00	13.00	13.00	14.00
Basic, del'd, eastern Pa..	13.50	13.50	13.50	14.25
Basic, Valley furnace....	12.50	12.50	12.50	13.25
Bessemer, Pittsburgh....	14.55	14.55	14.55	15.15
Malleable Bess., Ch'go*..	13.00	13.00	13.00	14.00
Gray forge, Pittsburgh...	13.45	13.45	13.45	13.65
L. S. charcoal, Chicago..	15.75	15.75	15.75	15.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	19.50	19.50	19.50	21.00
O.-h. billets, Pittsburgh..	19.50	19.50	19.50	21.00
O.-h. sheet bars, P'gh...	20.50	20.50	20.50	22.00
Forging billets, base, P'gh	24.00	24.00	24.00	25.00
O.-h. billets, Phila.....	21.40	21.40	21.40	23.40
Wire rods, Pittsburgh...	25.00	25.00	25.00	26.50
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	**11.75**	11.50	11.50	13.25
Iron rails, Philadelphia..	13.00	13.00	13.00	16.50
Carwheels, Chicago.....	10.00	10.00	10.00	12.50
Car heels, Philadelphia..	10.50	10.50	11.00	12.75
Heavy steel scrap, P'gh.	**11.75**	11.50	11.75	12.75
Heavy steel scrap, Phila.	10.00	10.00	10.00	11.00
Heavy steel scrap, Ch'go.	**9.75**	9.50	9.50	10.50
No. 1 cast, Pittsburgh...	11.25	11.25	11.25	12.00
No. 1 cast, Philadelphia.	12.00	12.00	12.00	13.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.25	10.75
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	1.20	1.20	1.17½	1.27½
Iron bars, Pittsburgh ..	1.10	1.10	1.15	1.40
Iron bars, Chicago.....	**1.07½**	1.02½	0.97½	1.12½
Steel bars, Pittsburgh....	1.10	1.10	1.10	1.20
Steel bars, New York....	1.26	1.26	1.26	1.36
Tank plates, Pittsburgh..	1.10	1.10	1.10	1.20
Tank plates, New York..	1.26	1.26	1.26	1.36
Beams, etc., Pittsburgh..	1.10	1.10	1.10	1.20
Beams, etc., New York...	1.26	1.26	1.26	1.36
Skelp, grooved steel, P'gh	1.10	1.10	1.10	1.25
Skelp, sheared steel, P'gh	1.15	1.15	1.15	1.35
Steel hoops, Pittsburgh..	1.20	1.20	1.20	1.30
Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	**1.80**	1.80	1.80	1.95
Galv. sheets, No. 28, P'gh	**3.25**	3.00	2.75	2.95
Wire nails, Pittsburgh...	**1.60**	1.55	1.55	1.60
Cut nails, Pittsburgh....	**1.55**	1.50	1.50	1.60
Fence wire, base, P'gh..	**1.40**	1.35	1.35	1.40
Barb wire, galv., P'gh...	**2.00**	1.95	1.95	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

Per Net Ton at Oven:	Feb. 17, 1915.	Feb. 10, 1915.	Jan. 20, 1915.	Feb. 18, 1914.
Furnace coke, prompt	$1.50	$1.50	$1.50	$1.85
Furnace coke, future	1.65	1.65	1.65	2.00
Foundry coke, prompt	2.00	2.00	2.00	2.50
Foundry coke, future	2.15	2.15	2.15	2.75

Metals.

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	15.25	15.25	14.00	15.00
Electrolytic copper, N. Y.	14.62½	14.75	13.87½	14.62½
Spelter, St. Louis	8.75	8.00	6.10	5.25
Spelter, New York	9.00	8.25	6.25	5.40
Lead, St. Louis	3.72½	3.67½	3.50	3.87½
Lead, New York	3.85	3.80	3.70	4.00
Tin, New York	36.12½	36.00	33.85	39.25
Antimony, Hallett's, N. Y.	18.50	18.50	17.00	7.00
Tin plate, 100-lb. box, P'gh	$3.10	$3.10	$3.10	$3.30

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal on plates, shapes, etc., is 46c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.10c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $1.80. Galvanized barb wire and fence staples to jobbers, $2; painted, $1.60. Wire nails to jobbers, $1.60. Woven wire fencing, 73 per cent. off list for carloads; 72 off for 1000-rod lots; 71 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized	1.90	1.95	2.00	2.05	2.15	2.25	2.65	2.75

Wire Rods.—Bessemer, open-hearth and chain rods, $25.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 11, 1915, and iron pipe from February 12, 1915, all full weight.

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	65½	⅜	65	44
¾ to 3	80	69½	½	69	54
			¾ to 2½	72	59

Lap Weld

2	77	66½	1¼	56	43
2½ to 6	79	68½	1½	67	54
7 to 12	77	66½	2	68	56
13 and 14	63½	..	2½ to 4	70	59
15	61	..	4½ to 6	70	59
			7 to 12	68	58

Reamed and Drifted

1 to 3, butt	78	67½	1 to 1½, butt	70	57
2, lap	75	64½	2, butt	70	57
2½ to 6, lap	77	66½	1¼, lap	54	41
			1½, lap	65	52
			2, lap	66	54
			2½ to 4, lap	68	57

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	68	55½	⅜	63	50
½	73	64½	½	67	58
¾ to 1½	77	68½	¾ to 1½	71	60
2 to 3	78	69½	2 and 2½	72	61

Lap Weld, extra strong, plain ends

2	74	63½	1½	65	55
2½ to 4	76	65½	2	66	57
4½ to 6	75	64½	2½ to 4	70	59
7 to 8	69	58½	4½ to 6	69	58
9 to 12	64	53½	7 to 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	63	54½	½	57	47
¾ to 1½	66	57½	¾ to 1½	60	50
2 to 2½	68	59½	2 and 2½	62	52

Lap Weld, double extra strong plain ends

2	64	55½	2	58	47
2½ to 4	66	57½	2½ to 4	60	52
4½ to 6	65	56½	4½ to 6	59	51
7 to 8	59	48½	7 to 8	52	42

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.	49
2½ and 2¾ in.	65	2¼ in.	45
3 and 3¼ in.	70	2½ and 2¾ in.	54
3½ and 4½ in.	72	3 and 3¼ in.	57
5 and 6 in.	65	3½ and 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points. On standard charcoal iron tubes for desirable orders the above discounts are shaded an extra 5, and occasionally two 5's by some makers.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.25 to 1.30
Nos. 9 to 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.45 to 1.50
No. 12	1.45 to 1.50
Nos. 13 and 14	1.50 to 1.55
Nos. 15 and 16	1.55 to 1.60
Nos. 17 to 21	1.60 to 1.65
Nos. 22 and 24	1.65 to 1.70
Nos. 25 and 26	1.70 to 1.75
No. 27	1.75 to 1.80
No. 28	1.80 to 1.85
No. 29	1.85 to 1.90
No. 30	1.95 to 2.00

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	2.25
No. 12	2.35
Nos. 13 and 14	2.35
Nos. 15 and 16	2.45
Nos. 17 to 21	2.65
Nos. 22 and 24	2.75
Nos. 25 and 26	2.95
No. 27	3.10
No. 28	3.25
No. 29	3.40
No. 30	3.55

Pittsburgh

PITTSBURGH, PA., February 16, 1915.

The large steel interests report the market to be moving along satisfactorily, specifications against contracts placed in December and January at 1.05c. to 1.10c. for plates, shapes and bars coming in at a fair rate, and some buying having taken place in these materials for prompt shipment at 1.10c. A few contracts have been made for second quarter at 1.20c., but not much significance is given to these, as their worth will depend on what happens between now and the start of the second quarter. On galvanized wire products prices are up $1 a ton; on galvanized steel pipe $6 a ton; galvanized iron pipe $4 a ton, and galvanized sheets $5 a ton. These advances are due to the very high prices ruling for spelter, which has been quoted as high as 8½c., East St. Louis. It is claimed that stocks of spelter have been very much depleted, heavy shipments having been made abroad, and that the advance in prices was not caused by manipulation but by actual demand and the low stocks. If this is true the higher prices on galvanized products will likely hold. The structural trade is quiet, very little new work being placed. The gain in operations among the steel mills is being held and has slightly increased in the past week. The Carnegie Steel Company is now operating 36 blast furnaces, a gain of 14 since January 1. This week it is operating close to 60 per cent. of ingot capacity. The coke market continues dull. Prices on scrap are steady. The whole situation is better, the tone of prices is strong, and mills report heavy demand from jobbers.

Pig Iron.—The local market is dull, there being little new inquiry. Prices are barely steady. The foundries are taking iron more promptly, but are still buying in small lots. There is an active demand for cold-blast charcoal iron, and a good deal has been sold in this district recently. Bessemer iron is weak at $13.60, and if any business was offering $13.50 or less could be done. We quote Bessemer iron at $13.60; basic, $12.50; malleable Bessemer, $12.75; No. 2 foundry, $13 to $13.25, and gray forge, $12.50, all at Valley furnace, with a freight rate of 95c. a ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—The billet and rail bureau of the Carnegie Steel Company reports specifications so far this month against contracts for billets and sheet bars as showing a large gain over the same period in January. Sheet and tin plate mills are specifying heavily for sheet bars, and consumers of billets are taking in more steel than for some time. Most consumers of sheet bars are covered by contract, and there is not much new buying. The Carnegie Steel Company is still out of the market as a seller of sheet bars, having commitments that will take its entire output for several months to come. We quote Bessemer and open-hearth billets at $18 to $18.50, and Bessemer and open-hearth sheet bars $19, f.o.b. maker's mills, Youngstown; Bessemer and open-hearth billets, $19.50 to $20, and Bessemer and open-hearth sheet bars, $20.50 to $21, f.o.b. maker's mills, Pittsburgh. Forging billets are quoted at $24 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. Axle billets are quoted at $21 to $22.

Ferroalloys.—The situation in ferromanganese is giving a good deal of concern to consumers. Importers are still quoting $68, seaboard, for English 80 per cent., subject to the embargo and also to the condition that the steel will not be sold in any form for export to Germany. Reports as to stocks held in this country are conflicting, some stating that they are heavy and others that they are very light. Sales of carload lots for prompt shipment from stock have been made at $85 to $90, seaboard. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $18; 11 per cent., $19, and 12 per cent., $20, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Steel Rails.—The Carnegie Steel Company will roll 6000 tons of standard sections at its Edgar Thomson Works for the Bessemer & Lake Erie Railroad. Current orders are fairly heavy, and there is some foreign inquiry, one lot embracing 20,000 tons of 70-lb. rails reported in the market for shipment to France. The coal companies are buying light rails more freely and the lumber interests are also placing some orders. We quote standard section rails made of Bessemer stock at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quite light rails as follows, in carload lots: 8 and 10 lb. sections, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c.

Structural Material.—A contract for 17,000 tons of steel for the Union Railway for grade crossing work in Indianapolis is reported to have been placed with three different interests. The American Bridge Company has taken 3000 tons for an addition to the New England building in Cleveland. Bids on the Central avenue viaduct in Cleveland will not be opened until March 2. New inquiry is light and local fabricators report they have taken no orders of importance in the past week. We quote beams and channels up to 15 in. at 1.10c. for February delivery, 1.15c. for March and 1.20c. for second quarter. However, very little material has been sold at the higher prices.

Plates.—Reports that the Carnegie Steel Company has taken 9000 tons of plates and shapes for the Fore River Shipbuilding Company for two boats are not confirmed here. No new car orders have been placed in the past week, but the general demand for plates from boiler shops and other consumers is reported slightly better. We quote ¼-in. and heavier plates at 1.10c., f.o.b. Pittsburgh, for prompt delivery, 1.15c. for March and 1.20c. for second quarter. The trade is placing some orders at 1.10c., but so far very little has been done at the two higher prices.

Tin Plate.—Operations among the tin plate mills are heavy, the American Sheet & Tin Plate Company running this week to about 95 per cent., while other leading makers are operating from 75 to 90 per cent. Specifications are coming in freely, and shipments of tin plate to the Pacific coast via the Panama canal are now going forward. Prices are firmer, due to the advance in pig tin, and on current orders, which are small, the mills are quoting $3.10 to $3.20 for 14 x 20 coke plates, f.o.b. Pittsburgh.

Sheets.—The Youngstown Sheet & Tube Company, American Sheet & Tin Plate Company and other leading makers have advanced prices on galvanized sheets $5 a ton, No. 28 now being held at 3.25c. for prompt shipment, and no contracts for future delivery will be taken at this figure. Jobbers are trying to place orders at 3c., but these are reported as being promptly turned down by the mills. Prices on black sheets are firm, but not any higher. Some mills have advanced their prices on blue annealed to a minimum of 1.35c. for Nos. 9 and 10 gauge. We quote No. 28 Bessemer black sheets at 1.80c. to 1.85c., No. 28 galvanized at 3.25c., Nos. 9 and 10 blue annealed sheets, 1.30c. to 1.35c., with some sellers holding for the higher price; No. 30

black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Wire **Rods.**—New inquiry is light, as consumers are covered up to July and mills report specifications coming in at a fair rate. Foreign inquiry is dull, no large lots having been sold recently. Prices are firm, and we quote Bessemer, open-hearth and chain rods at $25 to $25.50, f.o.b. Pittsburgh.

Shafting.—Prices are firmer, due to the stronger market on steel bars, but as yet there has been no advance. Specifications against contracts are coming in actively, and shipments by the mills are heavy. We quote cold-rolled shafting at 67 to 68 per cent off, delivered in base territory.

Railroad Spikes.—Specifications from the railroads against contracts for spikes placed in December and January are now coming in, and shipments will start in March and April. The Eastern roads have pretty well covered their requirements for spikes for this year, but some Western roads have yet to contract. We quote railroad spikes at $1.35 to $1.40, and small spikes at $1.45 to $1.50, in carload and larger lots, f.o.b. Pittsburgh, for first half.

Skelp.—New demand is quiet, but prices are firm. There is some foreign inquiry, but makers report that the high freights and difficulty in getting bottoms are operating against the securing of foreign business. We quote: Grooved steel skelp, 1.10c. to 1.15c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.50c.; sheared iron skelp, 1.50c. to 1.60c., delivered to consumers' mills in the Pittsburgh district.

Hoops and Bands.—Consumers are covered to April, and in some cases up to July, and new buying is light. Mills state that specifications are only fair. We quote steel bands at 1.10c., with extras as per the steel bar card, and steel hoops at 1.20c. to 1.25c., Pittsburgh, for first quarter delivery.

Wire Products.—Prices on all wire products have been advanced $1 a ton, and this will no doubt stimulate specifications on orders for wire nails taken some time ago at the $1.50 and $1.55 prices, and on plain wire at $1.30 and $1.35. There has been no new buying at the higher prices, but a few orders for wire nails at $1.55 and plain wire at $1.35 have been placed. It is said one or two leading wire mills were not in favor of general advance in wire products, but did favor an advance in galvanized wire. Specifications are active and shipments by the mills are heavy. The trade is covered to April or later, so that there will not be much new buying for some time. On new orders we quote wire nails at $1.60, plain annealed wire, $1.40; galvanized barb wire and fence staples, $2; painted barb wire, $1.60; all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. for cash in ten days. We quote woven wire fencing at 73 per cent. off in carload lots, 72 per cent. on 1000-rod lots and 71 per cent. on small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Specifications against contracts for steel bars, placed at 1.05c. to 1.10c. in December and January for delivery through first quarter, are coming in quite freely, but as yet there has not been much new buying at 1.15c. for March and 1.20c. for second quarter, these prices now being quoted by the mills. The test in the market will come in March, when the 1.15c. price goes into effect. The new demand for common iron bars is only fair and mostly in small lots for prompt shipment. We quote steel bars for February shipment at 1.10c.; March, 1.15c., and for second quarter, 1.20c., f.o.b. Pittsburgh. Common iron bars, made from part scrap, are 1.10c. to 1.15c., makers' mill.

Merchant Steel.—New demand is more active, several local mills filling large orders for steel to go into shrapnel shells for shipment to the belligerent countries. Iron finished tire, ½ x 1½ in., and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c.

Cold-Rolled Strip Steel.—Mills report new demand better and good specifications against contracts taken at prices slightly lower than are quoted now. Prices are firm, due to the higher figures being quoted by the mills on war materials. We quote hard-rolled steel, 1½-in. and wider, under 0.20 carbon, sheared or natural mill edges, per 100 lb., $2.75 delivered. Extras, which are standard among all the mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	$0.25	$0.10
0.099 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Wrought Pipe.—Prices on galvanized iron and steel pipe have been heavily advanced, due to the high market for spelter. One-eighth, ¼ and ⅜ in. galvanized steel pipe has been advanced $2; ½-in., $4, and on all other sizes from ¾ to 6 in. the discounts have been lowered 3 points, equal to an advance of $6 a ton. On black steel pipe from ⅛ to 6 in., discounts have been lowered 1 point, equal to an advance of $2 a ton. On galvanized iron pipe, discounts have been lowered 2 points, equal to an advance of $4 a ton on ½ in., $2 on ⅛, ¼ and ⅜ in., while on all sizes from ¾ to 6 in. discounts have been lowered 3 points, or an advance of $6 a ton. There has been no change in prices of black iron pipe. These advances went into effect on Thursday, February 11, and are now being uniformly quoted by all the mills. The new demand for both iron and steel pipe is heavier, jobbers trying to have the mills accept orders at the old prices, but these are being refused.

Boiler Tubes.—Prices on locomotive and merchant tubes are firmer, due to the advances in black and galvanized steel pipe, but as yet there has been no formal advance made by the mills. The demand for tubes is only fair.

Old Material.—There is a deadlock on between consumers and dealers in scrap, the former refusing to pay above $11.75 for heavy steel scrap, while most dealers are holding it at $12 and refuse to sell under that figure. The tone of the market is firm, but sales in the past week or two have been light, as dealers are inclined to hold their scrap believing the market will be higher before long. A sale of 2500 tons of heavy steel scrap for March and April shipment at about $11.75, delivered and one of 300 tons of machine shop turnings at close to $7.75, delivered are reported. For delivery to consumers' mills in the Pittsburgh and other consuming districts that take Pittsburgh freights dealers quote as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$11.75 to $12.00
Compressed side and end sheet scrap	10.25 to 10.50
No. 1 foundry cast	11.25 to 11.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock	10.00 to 10.25
Railroad grate bars	8.50 to 8.75
Low phosphorus melting stock	13.25 to 13.50
Iron car axles	18.75 to 19.25
Steel car axles	13.25 to 13.75
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	9.75 to 10.00
No. 2 busheling scrap	7.00 to 7.25
Machine shop turnings	7.50 to 7.75
Old carwheels	10.75 to 11.00
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	12.00 to 12.25
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.75 to 11.00
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	10.75 to 11.00

*Shipping point.

Coke.—The Carnegie Steel Company has started up three more blast furnaces and as a result the Frick

Coke Company started this week 340 more coke ovens, making close to 2000 ovens started up by this concern this month. All the plants of the Frick Coke Company operated 6 days last week and are expected to run on a 5 and 6-day basis right along. There is no new demand for coke for blast furnaces, as active stacks have covered up to July, and some over the entire year. The Connellsville Courier reports the output of coke in the upper and Lower Connellsville regions for the week ended February 6 as 256,358 tons, an increase over the previous week of 14,750 tons. We quote standard makes of blast-furnace coke for prompt shipment from $1.50 to $1.60; on contracts for delivery up to July 1, $1.65, and for delivery over all of 1915, at $1.75 per net ton at oven. Standard makes of 72-hr. foundry coke are held at about $2 for prompt shipment and from $2.15 up to $2.50 on contracts.

Chicago

CHICAGO, ILL., February 16, 1915.—(*By Wire.*)

The absence of substantial, individual tonnages of iron and steel in the Chicago district has been noticeable in the past week. The aggregate business has come from a variety of sources, which is one evidence that general conditions are steadily improving. The pig iron market has not changed materially, and prices for Northern and Southern are being firmly maintained. Shipments of tonnages up to 1500 tons, and of the higher silicon irons in quantities up to 500 tons are noted. Malleable inquiry has fallen off to some extent. The structural market is still conspicuously dull, the week's list totaling but 900 tons. The only important building project announced is the 14-story structure contemplated by Eiger & Brothers, hat manufacturers, for erection in the business district. Rail business reported here is confined to miscellaneous lots totaling approximately 6000 tons, but there is said to be considerable figuring for future contracts. Track supplies are being ordered out freely. Galvanized sheets are being supplied on the basis of 3.25c., Pittsburgh, for immediate delivery only, and for future delivery buyers are not interested. The bar-iron market shows considerable improvement, and the mills have generally adopted a minimum of 1.10c. with some hope of a further increase in the near future. The scrap market also, has strengthened, and wire products specifications are being received in satisfactory tonnages.

Pig Iron.—The market of the past week has not been such as to bring out any particular transactions of special significance. The run of business, while limited to lots of moderate size, is encouraging, in that the aggregate volume appears to be increasing. Lake irons are feeling this improvement to a greater extent than Southern iron, although some activity on the part of Southern furnaces is noted. Prices appear to be free of any particular pressure, which may be attributed, on the one hand to the comparatively small volume of business offering, and, on the other, to the very limited capacity in blast. Inquiry for charcoal iron includes some tonnage of importance. Inquiry for second half and last quarter is appearing, but furnaces are slow to commit themselves. Southern iron, of high silicon analysis, has been sold in lots from 100 to 500 tons. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2, 3, 5	$15.75
Lake Superior charcoal, No. 4	16.25
Lake Superior charcoal, Nos. 1 and 6	16.75
Northern coke foundry, No. 1	$13.25 to 13.75
Northern coke foundry, No. 2	13.00 to 13.25
Northern coke foundry, No. 3	12.50 to 13.00
Southern coke, No. 1 f'dry and 1 soft	13.75 to 14.25
Southern coke, No. 2 f'dry and 2 soft	13.50 to 13.75
Malleable Bessemer	13.00 to 13.25
Standard Bessemer	15.50
Basic	12.50 to 13.00
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. silv'y, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—Though no rail transactions of consequence were reported in the past week, miscellaneous selling approximated from 5000 to 6000 tons. A number of small tonnages were disposed of, against old contracts. The future still holds, in prospect, several attractive tonnages covering which early inquiry is expected. Specifications for track supplies are improving, and it is evident that the railroads are preparing for the usual spring increase of construction work. We quote standard railroad spikes at 1.50c. to 1.60c., base; track bolts with square nuts, 1.90c. to 2c., base, all in carload lots, Chicago; tie plates, $23.50 to $25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

Structural Material.—Extreme quietness in structural material was again apparent last week, when the total list aggregated less than 900 tons. The delayed Lyon & Healy building contract has been let to Wells Brothers, general contractors, but it is understood that the 2100 tons of shapes have not yet been awarded. The 2000 center-sills for the Burlington have been let to a local concern. Other contracts let included 124 tons for the Middle Fork Mining Company, Benton, Ill., 123 tons for a boiler house extension of the St. Louis Independent Packing Company, to Christopher & Simpson, 255 tons for the American Hoist & Derrick Company, to the McMyler-Interstate Company, 122 tons for a plate-girder bridge at Ladysmith, Wis., and 140 tons for a 425-ft. span in Graham County, Ariz., let to the El Paso Bridge & Iron Company. The week produced no new inquiry for car equipment, though a generally better business condition is indicated in the average run of specifications, which cover a variety of small lots. The Santa Fe placed 750 cars with Haskell & Barker. We continue to quote for Chicago delivery of plain shapes from mill, 1.289c.

We quote for Chicago delivery of structural material, from store, 1.75c.

Plates.—A slight betterment in the tonnage of plates taken in this market is reported. There is still a very disappointing lack of car plates, but tank plate specifications have appeared from a number of sources. So long as buying is so limited little can be hoped for in the matter of prices. We quote for Chicago delivery of plates from mill 1.239c. to 1.289c.

We quote for Chicago delivery of plates out of stock 1.75c.

Sheets.—No material change in this market is apparent from a tonnage standpoint. Galvanized sheets are being quoted on the basis of 3.25c., Pittsburgh, for immediate delivery only. The business transacted in the week has been of light tonnage, and prices have been firmly maintained on the above basis since February 11. In black and blue annealed sheets, there is a steady demand with nothing significant to report. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.489c.; No. 28 black, 1.989c.; No. 28 galvanized, 3.439c.

We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.60c.

Bars.—The steady improvement in this market and the accumulation of orders has advanced the ruling price of iron bars to 1.10c., though in one or two instances there is evidence of 1.07½c. One of the large mills in this territory has a back-log of 3300 tons at the mill. The Sellers Mfg. Company is starting up its mill after an idleness of three months. There is some movement in steel bars, and orders are coming in with sufficient rapidity to keep one mill working at 60 per cent. of capacity. Reinforcing bars have been rather quiet, but indications point to the placing of further business shortly. We quote for mill shipments as follows: Bar iron, 1.07½c. to 1.10c.; soft steel bars, 1.289c.; hard steel bars, 1.20c.; shafting in carloads, 65 to 68 per cent. off; less than carloads, 60 to 65 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 62 per cent. off.

Rivets and Bolts.—The bolt and nut market is reported as assuming, at the higher level of prices, a

much less disturbed condition. Rivet prices, also, appear not to be the occasion for as marked concessions as have prevailed.

We have revised quotations as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-20; cut thread, 80-15; larger sizes, 80; machine bolts up to ⅜ x 4 in., rolled thread, 80-25; cut thread, 80-20; larger sizes, 80-5; coach screws, 85-5; hot pressed nuts, square, $6.80 to $6.60 off per cwt.; hexagon, $7.80 to $7.60 off per cwt. Structural rivets, ¾ to 1¼ in., 1.50c. to 1.55c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.00c.; boiler rivets, 2.10c.; machine bolts up to ¾ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ¾ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Wire Products.—Specifications covering wire nails and fencing are coming in against contracts at a very substantial rate, following the advance in prices. There is apparent, as yet, no disturbance of prices on galvanized wire products as the result of the acute spelter situation, but some attention has been given to this possibility. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.589; wire nails, $1.789; painted barb wire, $1.789; galvanized, $2.189; polished staples, $1.789; galvanized, $2.189, all Chicago.

Cast-Iron Pipe.—After an excellent run of business in January, inquiry for city requirements has slackened a trifle, and the past week was rather quiet. The United States Cast Iron Pipe & Foundry Company was awarded the 1100 tons for Milwaukee, Wis., and the 140 tons for Ottumwa, Iowa. The American Cast Iron Pipe Company secured the 200 tons for Redford, Mich., while several lots quoted a week ago are still pending. Prospective lettings include 550 tons for Rockford, Ill., 1100 tons for Laramie, Wyo., and 125 tons for Faribault, Minn. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $23.50; 16 in. and up, $23, with $1 extra for gas pipe.

Old Material.—This scrap iron market shows further tendencies to firmness, though little business of special importance developed in the week, and railroad offerings were unusually light. The market has strengthened, and prices have been revised, with a general increase of 25c. per ton. Steel car axles are up 50c. a ton. Railroad offerings included 3000 tons from the Sante Fe, and the Michigan Central is offering 3000 tons, which includes 30 cars of carwheels. It is understood that the Milwaukee withdrew its recent list, for the present. We quote for delivery at buyers' works, Chicago and vicinty, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$11.75 to $12.25
Old steel rails, rerolling	10.00 to 10.50
Old steel rails, less than 3 ft	10.00 to 10.25
Old carwheels	10.00 to 10.50
Heavy melting steel scrap	9.75 to 10.00
Frogs, switches and guards, cut apart	9.75 to 10.00
Shoveling steel	9.00 to 9.25
Steel axle turnings	7.25 to 7.50

Per Net Ton

Iron angles and splice bars	$11.50 to $12.00
Iron arch bars and transoms	11.50 to 12.00
Steel angle bars	8.50 to 9.00
Iron car axles	13.75 to 14.25
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	8.50 to 9.00
Cut forge	8.50 to 9.00
Steel knuckles and couplers	8.75 to 9.00
Steel springs	9.25 to 9.75
Locomotive tires, smooth	8.50 to 9.00
Machine shop turnings	5.50 to 6.00
Cast borings	4.75 to 5.25
No. 1 busheling	8.00 to 8.25
No. 2 busheling	7.00 to 7.25
No. 1 boilers, cut to sheets and rings	5.50 to 6.00
Boiler punchings	8.25 to 8.50
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	8.25 to 8.50
Grate bars	8.00 to 8.25
Railroad malleable	8.00 to 8.25
Agricultural malleable	7.25 to 7.50
Pipes and flues	7.00 to 7.50

Over 11 per cent. of the Cleveland iron ore miners in England have joined the colors and the prohibition of further recruiting is being considered. The question was raised at the quarterly meeting of the association, December 28, at Birmingham.

Philadelphia

PHILADELPHIA, PA., February 16, 1915.

In several of the finished steel lines a slow improvement continues to be felt. What the trade needs most is business in good sized tonnages for the structural and plate mills, the first of which is dependent on an awakening in the building trade and the construction of bridges, while the latter needs to be stimulated by the ordering of cars and locomotives. In the betterment that is seen there are few propositions of noteworthy size, but the trade sees a healthy growth in the diverse nature of the demand. Exports look better and more could be done were it not for the problems of transportation. Those inquiring from abroad usually specify c.i.f., but those making prices here find it difficult to make better terms than f.o.b. There is a general belief that conditions on the other side may come to a pass where our terms must be met. Specifications for steel bars have been unexpectedly good. Local plate mills are operating up to 60 per cent. of capacity. The rail situation is encouraging. Specifications for sheets are a little more plentiful. The trade in billets is without certainty. The buying of pig iron continues light but shipments hold up. The situation in ferromanganese is unrelieved. Mills are showing a little more interest in scrap material but have not started buying.

Iron Ore.—Importations at this port in the week ended February 13 comprised 6500 tons from Cuba and 9648 tons from Sweden. There is no change in the situation with regard to new business.

Pig Iron.—Pipe makers on the Delaware river have purchased a few thousand tons of low grade iron. Otherwise sales continue light though some of the trade believe that there is at least a trifle more inquiry for foundry iron. Shipments are holding up well and are perhaps a little better except in a few cases where buyers made speculative purchases early in the year while under the impression that demand upon them would speedily improve but who have been disappointed. Foreign inquiry, especially from Italy, continues to attract the attention of the trade, most of which, however, cannot see how the high ocean freights can be surmounted. In spite of this fact it is known that outside of this district a couple of good deals in pig iron for export have been put through. The call from abroad is mostly for low phosphorus iron or some grade similar to it. In a transaction which is understood to be a special one, an eastern Pennsylvania company has taken some basic, but how much is not reported. A few hundred tons for western Pennsylvania shipment has been sold also. The freight rate advance will become effective on Eastern roads February 23. In the case of a shipment from Virginia to a point in Illinois the rate was advanced without warning, for some reason which the shipper cannot explain. The advance causes concern inasmuch as it gives Southern iron an advantage in rates. The American Road Machinery Company is inquiring for 100 tons of No 2 Southern, 100 tons of No. 2 Northern, 200 tons of No. 4 Southern and 200 tons of No. 4 Northern for delivery to Delphos, Ohio. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X foundry	$14.25 to $14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia No. 2 X foundry	15.25
Virginia No. 2 plain	15.00
Gray forge	13.50 to 13.75
Basic	13.50 to 14.00
Standard low phosphorus	20.00 to 21.00

Ferroalloys.—In a general way there has been no change in the ferromanganese situation, all concerned still awaiting action on the part of the English authorities. In some directions anxiety is growing. It is understood that Jones & Laughlin Steel Company is making ferromanganese and three other independent interests are known to have manganese ore which they are holding as a safeguard. The nominal price for quantities of any size is unchanged at $68, seaboard, for 80 per cent. material, but a few sales of small lots have been made at 5c. per lb. Most of the ferromanganese on which delivery has been suspended was bought at $38. The position of the English producers is realized, and there is a feeling that it would be but

just to pay higher prices at this time in order that the average might be raised for the benefit of the makers. The quotation for 50 per cent. ferrosilicon is unchanged at $71 to $73, Pittsburgh. A shipment of 18 tons arrived here from England last week.

Bars.—Specifications have been rather good for steel bars and sellers are correspondingly optimistic. The lots called for have been scattered and orders have been repeated in an unexpected manner. Quotations are unchanged at 1.25c. for immediate business, 1.30c. for March delivery, while 1.35c. is being asked for second quarter. Iron bars are holding up at about 1.20c., Philadelphia.

Plates.—The lack of railroad buying of cars and locomotive continues to retard the plate business seriously, although this is offset to some extent by the demand for ship-plates. With most mills the demand continues spasmodic. Most of the demand comes from Atlantic shipyards, though steel has been sold for a boat of less than 1000 tons to be built by the Great Lakes Engineering Works, Detroit. The general minimum quoted is 1.25c., Philadelphia, for immediate delivery with 1.30c. asked for next month and 1.35c. for the second quarter.

Steel Rails.—Though under normal, conditions continue encouraging. The Pennsylvania Steel Company has received an order from the Southern Railway for 900 tons and from an Eastern railroad one for 1000 tons.

Structural Material.—The Eastern Steel Company will supply 1250 tons for the office building of the Victor Talking Machine Company and 300 tons for an addition to the Strand Hotel, Atlantic City. No new propositions of magnitude have come out. The minimum quotation is still declared to be 1.25c., Philadelphia, but the lack of business precludes any real test of this level.

Sheets.—Makers find that consumers are specifying a little more freely against contracts, but not sufficiently to guarantee operations far ahead even at the present rate of production. Quotations are unchanged at 1.45c. to 1.50c. for No. 10 blue annealed sheets.

Billets.—Business continues indifferent and those who make billets for their own use and also sell to others are their own best customers. The quotation is unchanged at $21.40 for open-hearth rolling billets. Forging steel is about $4 higher.

Coke.—The market is weak and without interest. Quotations for prompt standard Connellsville furnace coke range from $1.50 to $1.60 per net ton at oven and $1.65 to $1.70 for first half shipment. Standard Connellsville foundry is quoted at $2 to $2.10 for prompt and $2 to $2.25 for contract. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—There is a little better inquiry, especially for heavy melting steel, but it has not culminated in buying. Material that ordinarily comes into this district is still being shipped elsewhere. It begins to look as if export sales, especially to Italy, are feasible. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$10.00 to $10.50
Old steel rails, rerolling	10.50 to 11.00
Low phosphorus heavy melting steel scrap	14.00 to 14.50
Old steel axles	13.50 to 14.00
Old iron axles	17.50 to 18.00
Old iron rails	13.00 to 14.00
Old carwheels	10.50 to 11.00
No. 1 railroad wrought	12.00 to 12.50
Wrought iron pipe	10.00 to 10.50
No. 1 forge-fire	8.00 to 8.50
Bundled sheets	8.00 to 8.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	8.00 to 8.50
Cast borings	8.00 to 8.50
No. 1 cast	12.00 to 12.50
Grate bars, railroad	8.50 to 9.00
Stove plate	8.50 to 9.00
Railroad malleable	9.00 to 9.50

Boston

BOSTON, MASS., February 16, 1915.

Old Material.—The market has experienced little change worth noting since last week. No important transactions are reported. Prices have not altered. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	$8.25 to $8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	12.75 to 13.25
Old iron axles	20.25 to 20.75
Mixed shafting	12.00 to 12.25
No. 1 steel wrought and soft steel	8.25 to 8.75
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	7.00 to 7.50
Cotton ties (bundled)	5.25 to 5.75
No. 2 light	3.25 to 3.75
Wrought turnings	5.00 to 5.50
Cast borings	5.00 to 5.25
Malleable	7.50 to 7.75
Stove plate	7.00 to 7.50
Grate bars	5.25 to 5.50
Machinery cast (price to consumers)	11.25 to 11.50

Buffalo

BUFFALO, N. Y., February 15, 1915.

Pig Iron.—The tone of the market is a little better and considerable more inquiry is noted than a week ago. Sales made have been almost entirely of small tonnages, individual orders scarcely exceeding 100 or 200 tons, the largest reported being 500 tons of low silicon. Specifications and shipments on outstanding contracts have been of fair volume. The Buffalo Union Furnace Company placed its furnace B in operation last week and the three stacks of the company are now running full with orders on hand for a considerable period ahead. Prices are firmly held at the level reported last week which are as follows, f.o.b. furnace, for first half delivery:

No. 1 foundry	$13.25 to $13.50
No. 2 X foundry	13.00 to 13.25
No. 2 plain	13.00
No. 3 foundry	13.00
Gray forge	12.75 to 13.00
Malleable	13.00 to 13.25
Basic	13.50
Charcoal, regular grades and analysis.*	15.75 to 17.00

*The minimum applying only to direct shipments from furnace instead of from storage yards or docks at Buffalo.

Finished Iron and Steel.—Most producers and agencies report improved conditions over last week, with heavier specification against contracts and an increase in miscellaneous inquiry and orders from a more diversified class of users. One agency reports specifications released for immediate shipment on steel-bar contracts originally ordered for shipment March 1 to 10. Schedule prices for bars, shapes and plates reported last week are firmly held and some selling agencies have instructions to report to headquarters at mills before accepting new business at 1.20c. for delivery to the end of the second quarter. Steel pipe specifications have shown improvement, due probably to the advance which took place on February 11 and the advance of $1 per ton on wire has had a tendency to bring in specifications on old contracts in wire products. An improved tone and some renewal of activity is noted in Canadian business. In fabricated structural material bids are being taken this week on steel for a hospital building at Newark, N. Y., a high school building at Utica, each requiring about 100 tons, and an infirmary building for the Rome Custodial Asylum, Rome, N. Y., requiring about 200 tons. The F. L. Heughes Company, Rochester, has the contract for the steel for the addition to the Clark Canning Company's factory in that city, about 150 tons.

Old Material.—The week has shown some increase in demand and a stiffening in price for some grades of scrap, particularly heavy melting steel, which is now firmly held at $10.50 to $10.75, f.o.b. Buffalo, for immediate delivery. One of the larger users of the district this week placed orders covering requirements in this commodity for some time ahead on the basis of $10.50, f.o.b. Buffalo. A considerable speculative buying movement in heavy melting steel was noted the latter part of last week and some dealers secured a considerable tonnage of this scrap; but at prices slightly above the present level. Aside from heavy melting steel, borings and turnings are the most active commodities on the list. Prices for these and for the remainder of the list are very firm, although not quotably higher than

a week ago. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel	$10.50 to $10.75
Low phosphorus steel	12.50 to 13.00
No. 1 railroad wrought scrap	10.00 to 10.50
No. 1 railroad and machinery cast	10.50 to 11.00
Old steel axles	12.00 to 12.50
Old iron axles	16.00 to 16.50
Old carwheels	10.00 to 10.50
Railroad malleable	9.50 to 10.00
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	8.50 to 9.00
Clean cast borings	6.00 to 6.50
Old iron rails	11.00 to 11.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.25 to 8.75
Wrought pipe	6.50 to 7.00
Bundled sheet scrap	7.00 to 7.50
No. 1 busheling scrap	7.50 to 8.00
No. 2 busheling scrap	5.25 to 5.75
Bundled tin scrap	10.00

Cincinnati

CINCINNATI, OHIO, February 16, 1915.

(By Wire)

Pig Iron.—A few round lots of Northern foundry iron were placed last week, but the largest sale reported covers 2000 tons to a melter in the Central West. Other smaller tonnages went to Ohio melters, for shipment over the remainder of the year. The opening of furnace books for last half delivery was a factor in bringing out this new business. It is rumored that a part of the tonnage booked was at the present minimum quotation for prompt shipment, and in a few instances strictly last half orders were taken at the same figure. Some Southern foundry iron has been bought locally, and by nearby consumers, but one of the pending local deals reported last week is yet unclosed. A spasmodic effort has been made to advance Southern iron quotations, but so far it has not been successful. The prompt shipment carload business has fallen off considerably during the past few days, but shipments on contracts have shown some improvement, especially where jobbing foundries are involved. The stove foundries are not melting the usual tonnage for this season, but they are nearly all taking care of the iron due them. There is an inquiry out from central Ohio for approximately 500 tons of low phosphorus iron for shipment in the next 6 months, and there is also some interest taken in high-manganese iron. Both basic and malleable are very dull, and the melt of the former has been lately curtailed to a considerable extent in this vicinity. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$12.90 to $13.40
Southern coke, No. 2 f'dry and 2 soft	12.40 to 12.90
Southern coke, No. 3 foundry	11.90 to 12.40
Southern No. 4 foundry	11.40 to 11.90
Southern gray forge	10.90 to 11.40
Ohio silvery, 8 per cent. silicon	16.26 to 16.51
Southern Ohio coke, No. 1	15.01 to 15.51
Southern Ohio coke, No. 2	14.01 to 14.51
Southern Ohio coke, No. 3	13.76 to 14.01
Southern Ohio malleable Bessemer	14.26
Basic, Northern	14.26
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	26.90 to 27.40

(By Mail)

Coke.—Sales agencies report that shipments of foundry coke on old contracts show some improvement, but new business continues very scarce. The stove foundries are not consuming their usual quantity of coke at this time of the year. Furnace coke is quoted in all three fields around $1.50 to $1.75, and foundry coke at $2 to $2.40 per net ton at oven.

Finished Material.—The Newport Rolling Mill Company has withdrawn all old quotations on galvanized sheets, and its best price to-day is 3.25c., Pittsburgh basis, on No. 28 gauge. The unsettled condition of the spelter market has been the cause for advancing prices on galvanized sheets, and at the present time the mills are only willing to quote on inquiries that include specifications, and that call for prompt shipment of the material. Black sheets are unchanged and range from 1.80c. to 1.85c., Pittsburgh. There is a slight improvement in the demand for reinforcing concrete bars, and as there are several building contracts that will come up early in the spring, requiring different kinds of structural material, the outlook for reinforcing bars as well as structural shapes is a little more encouraging.

Old Material.—While the foundries are taking a fair tonnage of iron the rolling mills in this territory are not consuming the usual quantity, and until they resume work on full time and with a full force there is not apt to be much demand from the last-named source. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, Southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.25 to $6.75
Old iron rails	11.00 to 12.00
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	9.75 to 10.25
Melting steel rails	8.75 to 9.25
Heavy melting steel scrap	8.50 to 9.00

Per Net Ton

No. 1 railroad wrought	$7.50 to $8.00
Cast borings	4.00 to 4.50
Steel turnings	4.00 to 4.50
Railroad cast scrap	9.25 to 9.75
No. 1 machinery cast scrap	9.75 to 10.25
Burnt scrap	6.00 to 6.50
Old iron axles	13.50 to 14.00
Locomotive tires (smooth inside)	8.75 to 9.25
Pipes and flues	5.50 to 6.00
Malleable and steel scrap	6.75 to 7.25
Railroad tank and sheet scrap	4.50 to 5.00

Cleveland

CLEVELAND, OHIO, February 16, 1915.

Iron Ore.—The Eastern ore situation is being closely watched by Lake ore firms, but they are unable to forecast the market prospects in the East until foreign ore prices are established. This may not be for some time, owing to the fact that Eastern furnace companies have large stocks on hand and are not taking any interest in the market. In our Philadelphia report last week we noted the advance on Sagmerena ore from Spain from 6½c. to 8¾c. per unit. In comparison with this price Lake ore prices for delivery to most Eastern furnaces last season, with a $1.45 freight rate, were 8c. and higher for off grades non-Bessemer ores, approximately 9c. per unit for standard non-Bessemer ores and 9½c. to 10c. per unit for Bessemer ores. We repeat 1914 prices as follows: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—New demand is very light, few sales being reported and those being for small lots. Shipments are fairly good and a favorable indication is that the melt has improved considerably in the past 30 days. Foundry iron is held at $12.75, Cleveland, for outside shipments and the same quotation for No. 2 is being made by Valley furnaces. We note the sale of a few small lots of Southern iron for the second quarter at $9.50 for No. 2, and 200 tons of silvery iron to a Cleveland consumer at $15 for 8 per cent. silicon. This is the usual market price on silvery, although one producer is asking $15.50. We quote, delivered Cleveland, as follows:

Bessemer	$14.55
Basic	13.45
Northern No. 2 foundry	13.50
Southern No. 2 foundry	$13.50 to 13.75
Gray forge	13.00
Jackson Co. silvery, 8 per cent. silicon	16.62 to 17.12
Standard low phos. at furnace	19.75 to 20.00

Coke.—The market is inactive, there being practically no new demand for either grade. Prices are unchanged. We quote standard Connellsville furnace coke at $1.50 to $1.60 per net ton at oven for spot shipment. Foundry coke is held at $2.25 to $2.50 for the best grades for prompt shipment and contracts.

Finished Iron and Steel.—Little change has developed, but the tendency is still toward an improvement in demand. New business is rather light, but there is a fair volume of specifications and consumers are generally asking for prompt shipment of their orders, indicating that the steel is being consumed about as fast as it comes from the mills. Warehouse business, which recently improved materially, continues very good. Specifications in good volume are coming from the automobile trade. Regular prices are firmly maintained on steel bars, plates and structural material and fewer efforts are being made by buyers to secure concessions. In structural lines new inquiries are out for the Hamilton County Court House, Cincinnati, requir-

ing 2900 tons, 400 tons for the Northern National Bank, Toledo, and 400 tons for the Detroit school, Toledo. An inquiry is also out for 400 tons of reinforcing bars for a building for the Ford Motor Company in Louisville, Ky. A recent inquiry for forging billets in this market has brought out some low prices, quotations having been made down to $22, Pittsburgh. The price on galvanized sheets has been further advanced to 3.25c. Other sheet prices are unchanged at 1.80c. for No. 28 black and 1.35c. for No. 10 blue annealed. There is little life in the bar iron market and prices are unchanged at 1.05c. at mill for outside shipment and 1.15c. for Cleveland delivery. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—Prices on bolts and nuts are more regular than for some time. Specifications are fair, but there is not much new demand as consumers are mostly under contract. The bolt and nut works of the Republic Iron & Steel Company, at Muncie, Ind., which has been shut down for some time, was started up February 15. It is estimated that plants are now being operated at an average of 55 to 60 per cent. capacity. Rivets are quoted 1.45c. for structural and 1.55c. for boiler, with $1 a ton higher prices for small lots. We have revised our bolt and nut quotations and the following representing the maximum discounts for delivery to consumers up to July 1. Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 80 per cent.; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 85 per cent.; cut thread, 80 and 20 per cent.; larger or longer, 80 and 5 per cent.; coach and lag screws, 85 and 5 per cent.; square h.p. nuts, blank or tapped, $6.50 off; hexagon h.p. nuts, blank or tapped, $7.40 off; c.p.c. and t. square nuts, blank or tapped $6.20 off; hexagon ⅝ in. and larger, $7.50 and $7.75 off; 9/16 in. and smaller $8 and $8.25 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10, 10 and 5 per cent.; 9/16 in. and smaller 85, 10, 10 and 10 per cent.

Old Material.—There is some demand by Valley mills and dealers for heavy melting steel and turnings, but in Cleveland the market is usually dull. In spite of the local inactivity the outside demand has caused some stiffening in prices locally. Heavy steel and a few other grades have advanced 25c. a ton. In the Mahoning Valley $11.25 is the usual quotation for heavy melting steel, and sales of turnings have been made at $7.50. In the local market busheling has sold at an advance of 25c. a ton and turnings as high as $6.25, but these prices were for delivery during February, March and April. We quote f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.00 to $11.75
Old iron rails	12.00
Steel car axles	13.25 to 13.50
Heavy melting steel	9.75 to 10.00
Old carwheels	10.00 to 10.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	10.00 to 10.25
Light bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron car axles	$16.00 to $16.50
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	5.50 to 6.00
Steel axle turnings	6.25 to 6.50
No. 1 busheling new	8.65 to 9.00
No. 1 busheling old	8.50 to 8.75
No. 1 railroad wrought	9.50 to 10.00
No. 1 cast	10.00 to 10.50
Stove plate	7.50 to 7.75

Birmingham

BIRMINGHAM, ALA., February 15, 1915.

Pig Iron.—Another uneventful week has passed in the Southern iron market with sales mostly in small lots and the average of prices remaining at $9.50 to $9.75. The inquiry for third quarter iron is on the increase with a few sales made when a portion is for the second quarter. Under such conditions prevailing prices have been allowed, but the tendency is to hold for higher prices for strictly third quarter or second half delivery. The pleasing feature of the week is the increase in the demand for foreign delivery. It is evident that as soon as proper shipping arrangements can be made, a large amount of Southern iron will traverse the seas. One remarkable sale was made by a Birmingham manufacturer. It consisted of 2000 tons of No. 2 foundry and was sold at $10.25 f.o.b. Birmingham for English delivery. This is one of the best deals made in a long time. Manufacturers and brokers are growing more optimistic as the general aspect of business appears to be improving, but none seems to expect any decided change for the better until hostilities in Europe cease. The larger pipe interests are again sounding the market and some good-sized sales are expected. The manufacture of basic iron is on the increase and the prospect of its liberal use at home continues to be good. The Ensley rail and ingot mills are now on their third week of consecutive full operations and conditions at the Fairfield mill of the American Steel & Wire Company are also for the better, with more men being taken on straight along. We quote per gross ton f.o.b. Birmingham furnaces, as follows:

No. 1 foundry and soft	$10.00 to $10.25
No. 2 foundry and soft	9.50 to 9.75
No. 3 foundry	9.00 to 9.25
No. 4 foundry	8.75 to 9.00
Gray forge	8.50 to 8.75
Basic	9.50 to 10.00
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—The makers of gas and water pipe have order books in very good shape and are increasing the melt. Each week adds to the takings of municipalities. It is understood that the leading interest is to expend $50,000 on improvements owing to excellent conditions. The sanitary pipe shops report a better situation than has existed for some time. We quote per net ton f.o.b. pipe shop yards, as follows: 4 in., $20; 6 in. and upward, $18, with $1 added for gas pipe.

Coal and Coke.—Coal is dull. Government authorities report that lock No. 17 on the Warrior River will be ready for use by April 25, the gates being now in place. Extraordinary preparations are being made for barging coal to Mobile and New Orleans. A short line of railroad from Birmingham to the river is also seriously considered. Coke holds its own in prices with a reported brisk movement to the far west. We quote per net ton f.o.b. ovens, as follows: Furnace coke, $2.75 to $2.90; foundry, $3.20 to $3.45, with as high as $3.75 for the best grade.

Old Material.—The market is dull and listless. Steel scrap has moved a little more freely, but business is not on a large scale. We quote per gross ton f.o.b., dealers' yards (nominal), as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.00 to 12.50
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.00 to 7.50
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	8.50 to 9.00
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, MO., February 15, 1915.

Pig Iron—There has been an increase of inquiry in the market in the past week and some sales have been made, all of 300 tons and less for first and second quarter delivery. The aggregate has been about 2500 tons. Inquiries still pending in the market include half a dozen for 300 tons, all No. 2 Southern; one for 700 tons divided into 500 tons of Northern and 200 tons of Southern No. 2 grades and one for 600 tons special analysis high silicon and high manganese iron. There has also been some inquiry for ferromanganese, indicating a shortage in the supply, but no actual transactions have taken place.

Coke—The business in coke is in car-load lots so far as Connellsville, Virginia and other ovens are concerned, with the quotation unchanged. By-product coke has been active with one sale of 15,000 tons, Alton, Ill., delivery, at a figure withheld.

Finished Iron and Steel—Slowly increasing activity is apparent, but the fabricators continue to purchase only for specific work, and structural shapes are therefore only being taken in small lots for small jobs.

There is, however, a greater number of these appearing and this is increasing the total tonnage, with the price firmly held at 1.15c. Bars are in better demand, but buyers are still conservative and disinclined to speculate on the future by placing contracts for future delivery. Orders, therefore, are of the hand to mouth character. In rails a number of indefinite inquiries have been made by roads in the St. Louis territory, but no specific tonnage has been mentioned as yet. However, their interest in the market has helped to improve the tone. Light rails are spotted in their activity, the liveliest center now being the Joplin ore district where the record breaking prices have started exceptional extension and development work. Movement out of warehouse has been steady and very satisfactory in volume and character. Prices for warehouse stock are well held at these figures: Soft steel bars, 1.70c.; iron bars, 1.65c.; tank plates, 1.80c.; structural material, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, 2.55c.; No. 28 galvanized sheets, 3.55c.

Old Material—A feeling of softness as to prices is detected, but not sufficient to cause any reduction. On the contrary the dealers are still optimistic and look for improvement in business and prices shortly. Mills and foundries are taking small lots as needed and the continuous character of this demand, small though it may be in individual orders, is helping to maintain the optimism. The only list out during the week was one of 700 tons from the Frisco. We quote dealers' prices f.o.b. St. Louis, as follows:

Per Gross Ton

Old iron rails	$10.50 to $10.75
Old steel rails, re-rolling	10.25 to 10.50
Old steel rails, less than 3 feet	11.50 to 12.00
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.25 to 10.50
No. 1 railroad heavy melting steel scrap	9.50 to 9.75
Shoveling steel	8.75 to 9.00
Frogs, switches and guards cut apart	9.75 to 10.00
Bundled sheet scrap	6.00 to 6.25

Per Net Ton

Iron angle bars	$10.75 to $11.00
Steel angle bars	9.00 to 9.25
Iron car axles	15.00 to 15.50
Steel car axles	10.75 to 11.00
Wrought arch bars and transoms	11.25 to 11.50
No. 1 railroad wrought	8.25 to 8.50
No. 2 railroad wrought	8.00 to 8.25
Railroad springs	8.75 to 9.00
Steel couplers and knuckles	9.00 to 9.25
Locomotive tires, 42" and over, smooth inside	9.00 to 9.25
No. 1 dealers' forge	7.50 to 7.75
Mixed borings	5.25 to 5.50
No. 1 busheling	7.75 to 8.00
No. 1 boilers, cut to sheets and rings	6.25 to 6.50
No. 1 railroad cast scrap	9.50 to 10.00
Stove plate and light cast scrap	8.00 to 8.25
Railroad malleable	7.25 to 7.50
Agricultural malleable	6.75 to 7.00
Pipes and flues	6.25 to 6.50
Railroad sheet and tank scrap	6.25 to 6.50
Railroad grate bars	7.50 to 7.75
Machine shop turnings	5.75 to 6.00

San Francisco

SAN FRANCISCO, CAL., February 9, 1915.

Business is spotted and irregular, with only scattering orders from large consumers and no activity in development work. Merchants are still replenishing their stocks in a conservative way, buying only for the comparatively near future. Trade in the distributing branches is limited by seasonable weather, though the outlook in the country is good. Water freight rates are still stiffening, but show considerable irregularity, while lack of ship space has caused a heavier movement by rail. Local prices are a little firmer.

Bars.—Jobbing business in soft steel bars is seasonably light, though specifications are fair for this time of year, the announced advance and the freight situation having aroused some interest. One of the local mills has its output well taken for several months ahead, and prices are firmer, carloads from store or from local mills being quoted at 1.62½c. to 1.65c. Demand for reinforcing bars is unimportant.

Structural Material.—The Schrader Iron Works and the Mortenson Construction Company have taken small jobs, but otherwise few contracts have been placed, and little is being figured locally. Fabricators are taking considerable interest in the Columbia River bridge and the government tower job, aggregating over 12,000 tons. Bids for the latter will be opened February 27. Fabricators are restricting their plain material purchases rather closely to work in hand.

Plates.—Few orders of importance have been placed recently, but some good-sized tank work is still to be covered. Specifications are fair for this time of year, though jobbing business remains quiet. Prices are stiffening, carloads from store being quote at 1.70c.

Sheets.—The advance in galvanized sheets has brought out some inquiry. The price is quite generally held up to the basis of 3c., Pittsburgh, for prompt shipment, and this, with advanced freight rates, means a sharp advance over the previous prices. A very fair tonnage for mandatory requirements has been taken at the new prices. Black and blue annealed are less active, with little consuming demand. Specifications are limited to current needs.

Wrought Pipe.—A very fair tonnage was booked last month, and small orders from merchants are still numerous, though no important inquiries have appeared. The small jobbing and plumbing supply trade remains very dull.

Cast-Iron Pipe.—Former inquiries from Los Angeles, San Diego and Pasadena have all resulted in business, and the latter town will take bids February 16 for 55 tons more. The town of Azusa is expected in the market soon, and Portland, Ore., is to take bids for about 5000 tons. The town of Hilo, Hawaii, has placed a small order, and the city of Manila will take bids March 4 for about 300 tons.

Pig Iron.—Nothing new has developed in the pig-iron situation, as foundry work shows little improvement and most melters are supplied for some time ahead. At the same time a rather large tonnage remains in importers' hands. Prices continue irregular.

Coke.—Stocks are large and there is little movement locally, foundry requirements being light. Conditions indicate largely increased smelter operations, however, which may alter the situation somewhat. The smelters are said to be well supplied at present, but appear to be taking more interest in the market. Local yards quote $12.50 per net ton, while English coke, to arrive, is quoted at $11 to $12 per gross ton.

Old Material.—Cast-iron scrap continues to move in a limited way only at about $14 to $16 per net ton, requirements being light with melters buying only in a hand-to-mouth way. There is practically no movement of steel melting scrap, as the steel plants are well supplied and look for easy prices in view of the large tonnage which is known to exist in this vicinity. Prices are accordingly little more than nominal.

New York

NEW YORK, February 17, 1915.

Pig Iron.—Despite the exceptional activity of many users of gray iron castings, in various parts of this territory, inquiry for pig iron remains flat. Melters are taking out iron on their contracts in very satisfactory manner, but new sales appear only when, and in such quantity, as apparently, unexpected requirements demand for immediate covering. No disturbance of the price situation has appeared, which needs no further explanation than that sales are largely confined to lots of less than 300 tons. No progress has been made in providing for the shipment of iron on export inquiry, though, in a few instances, incoming vessels have been engaged for their return passage. Sales of a round tonnage of pipe iron is reported. Northern iron for tidewater delivery is quoted as follows: No. 1 foundry, $14.45 to $14.95; No. 2 X, $14.20 to $14.45; No. 2 plain, $13.95 to $14.20. Southern iron may be quoted at $14.50 for No. 1 and $14 to $14.25 for No. 2.

Ferroalloys.—Producers of English ferromanganese have been making tentative propositions through representatives in this city to consumers here who have un-

filled contracts that the tonnage still due on these contracts be filled at the present quotation of $68, seaboard, instead of at the price made in the original contract, $38, seaboard. This step is due to increased cost of ore and freight. It is reported that this has met with some favor and that some acceptances have been made. However, no further information is obtainable as to when the embargo will be lifted and shipments made. None are likely now to be received this month. More anxiety is being manifested by some consumers especially those that are low in their supply. It is estimated that the average supply of the consumers is sufficient to last three months, some having more than this and some much less. This fact, coupled with the estimate, printed in another column, that our imports of manganese ore were 25 per cent. less in 1914 than in 1913 and imports of ferromanganese 40 per cent. less in 1914 than 1913, will not cause the anxiety to lessen. Rumors of sales of spot or resale material at $90, seaboard, are heard. It is said that the Maryland Steel Company is now producing ferromanganese for its own use from ore purchased sometime ago, which is the second recent domestic producer, the other being the Jones & Laughlin Company, outside, of course, of the Carnegie Steel Company. Several recent foreign contracts for spiegeleisen are reported closed not only by representatives in this city but by the leading producer. No change is reported in 50 per cent. ferrosilicon which is obtainable at $71 to $73, Pittsburgh.

Cast-Iron Pipe.—Business has fallen off for this month as compared with January, and keen competition continues. The 300 tons of 8-in. pipe for Yonkers, N. Y., for which bids were received on February 15, have gone to John Fox & Co. at $21.13 per ton. An award has not been made at this writing for the 375 tons for Revere, Mass., the low bidder having filed figures shortly after the specified time. Carload lots of 6-in. are available at $20 to $20.50 per net ton, tidewater.

Structural Material—While present bidding is mainly on municipal and Government work, reports from architects' offices are unusually encouraging with regard to large building projects soon to come into the Metropolitan district. Prices are none too firm, some of the late awards indicating pretty close figuring on the plain material as well as for the fabrication and erection. Railroad buying is negligible and there is little hope that railroads will find any special needs for bridge work for some time. Toward the end of the month bids will be taken on some 7500 tons for third tracking the Broadway elevated line, Brooklyn, for the New York Municipal Railways. At this writing the award for the 13,000 tons for third tracking elevated railroads in Brooklyn for which Post & McCord were low bidders has not yet been closed. W. B. Shafer & Co. have taken 500 tons for the Nassau court house at Mineola, L. I., and the McClintic-Marshall Company has 300 tons for a stock house for the Acme Cement Company at Catskill, N. Y. The Hay Foundry & Iron Works is expected to secure the 1600 tons for the Newark Market and the Belmont Iron Company 400 tons for the Jacobs apartment house, East Seventy-ninth street. The general contract has been placed for the Union branch of the Y. M. C. A., in the Bronx, involving 500 tons. We quote mill shipments at 1.10c. to 1.15c., Pittsburgh, or 1.26c. to 1.31c., New York, and from store 1.85c. to 1.90c., New York.

Plates.—The considerable amount of large shipbuilding has not as yet given any impetus to the building of smaller boats, but sufficient plate business is moving to keep the mills at close to 50 per cent. capacity. Railroad car buying has not brightened and generally the situation has a weak tendency with some new buying of plates at lower than the ruling market. Universal plates are not in active demand owing to the low demand of the structural market. We quote steel plates at 1.10c. to 1.15c., Pittsburgh, or 1.26c. to 1.31c., New York, and from store 1.85c. to 1.90c., New York.

Steel and Iron Bars.—Specifications appear generally to be slightly above immediate needs, indicating no great fear on the part of the buyer regarding the prices of the future, but at the same time suggesting a little caution to protect himself to some extent against stiff maintenance of the established prices. Railroad buying is disappointing in bar iron products particularly. A lull is looked for in March, but there are no signs of price weakness but rather that mills will hold closely for 1.15c., Pittsburgh, in March, and 1.20c. for the second quarter. It appears that some contracting for the second quarter was done prior to naming the late prices at 1.10c., Pittsburgh. We quote mill shipments of steel bars at 1.10c. to 1.15c., Pittsburgh, or 1.26c. to 1.31c., New York. Out of store in New York we quote iron and steel bars at 1.80c. to 1.85c.

Old Material.—No encouraging events have transpired. Neither the rolling mills nor the foundries are showing any interest and what business could be done with eastern Pennsylvania consumers of heavy melting scrap offers too small a margin to be attractive. Inquiry is still up for export, including round lots of carwheels, crop ends, rails and heavy melting steel for Italy, but the buyer is not disposed to meet the current high ocean freights which threaten to become even higher, nor are dealers anxious to close for business free aboard ship for the same reason. Dealers continue to quote as follows, per gross ton, New York:

Old girder and T rails for melting	$8.00 to	$8.25
Heavy melting steel scrap	8.00 to	8.25
Relaying rails	19.00 to	19.50
Rerolling rails (nominal)	8.25 to	8.50
Iron car axles	15.00 to	15.25
Steel car axles	11.25 to	11.75
No. 1 railroad wrought	9.75 to	10.25
Wrought-iron track scrap	9.25 to	9.75
No. 1 yard wrought, long	9.25 to	9.75
No. 1 yard wrought, short	8.25 to	8.50
Light iron	3.50 to	4.00
Cast borings	5.75 to	6.25
Wrought turnings	5.75 to	6.25
Wrought pipe	7.50 to	7.75
Carwheels	9.00 to	9.25
No. 1 heavy cast, broken up	10.25 to	10.50
Stove plate	8.00 to	8.25
Locomotive grate bars	7.00 to	7.50
Malleable cast	7.00 to	7.50

British Pig-Iron Market Dull

American Sales of Billets—Germany Selling Iron to Italy

(*By Cable*)

LONDON, ENGLAND, February 17, 1915.

The fuel position and the general transportation congestion are becoming increasingly serious. Pig iron is dull and featureless, with shipments of trifling importance. Germany is selling Luxemburg foundry iron to north Italy at 70s. ($17) delivered. Active furnaces in three principal districts number 167 against 164 a year ago. Stocks of pig iron in Connal's stores are 121,077 tons against 119,756 tons last week.

American semifinished steel is being offered, and independents have sold 2-in. billets at 117s. ($28.47) c.i.f. The Liverpool Steel Corporation asks 127s. ($30.90) c.i.f. Newport, or 90s. ($21.90) f.o.b., for sheet bars for second quarter shipment. Finished steel is firm, but inactive. Tin plates are firm and galvanized sheets strong, with No. 24 gauge about £13 10s. ($65.69) and upward. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 15s. ($3.65).

Cleveland pig iron warrants, 56s. 9d. ($13.81) against 56s. ($13.62) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 56s. 5d. ($13.72), against 56s. 6d. ($13.74) last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £10 ($48.66), against £9 15s. ($47.44) last week.

Steel ship plates, Scotch, delivered local yards, £8 10s. ($41.36).

Steel rails, export, f.o.b. works port, £7 2s. 6d. ($34.67), an advance of 61c. over last week.

Hematite pig iron, f.o.b. Tees, 90s. ($21.89).

Sheet bars (Welsh), delivered at works in Swansea Valley, £6 10s. ($31.63), against £6 5s. to £6 10s. ($30.41 to $31.63) a week ago.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £8 ($38.93).

Steel bars, export, f.o.b. Clyde, £8 5s. ($40.14).

Pig Iron Easier—Tinplates Advancing—American Business Small

(By Mail)

LONDON, ENGLAND, February 4, 1915.—There has been a slightly easier tone in Cleveland pig iron, but the market is so entirely governed by abnormal conditions that it is a matter of the greatest difficulty to size up things in a reasonable way. There are only about the same number of furnaces blowing now that were at work a year ago, but the statistical position is beginning to deterioriate as the result of the impediments in the way of making shipments from the Tees by water. For the last month these shipments averaged only about 630 gross tons per working day, while last year for the same time they averaged 2700 tons. It is impossible for the deliveries to be cut down in this fashion without some accumulation of stock. Hence the fact that the holdings in the public stores are creeping up excites little attention, especially as the total at present in the yards is trifling. On the other hand there is some ground for thinking that makers have a fair quantity on hand. The speculative interest in Cleveland iron has dwindled to about half what it was, the price being regarded as too high to encourage further bull efforts, while the high costs of ore and the possibility of trouble in the coal trade tend to check the activities of bears. Furnacemen in the Midlands talk of there being less inquiry now than a fortnight or so ago, and the impression is that consumers are fairly well provided for. In the hematite trade things are exceedingly tight and likely to continue so. The basis of the firmness in the trade is the scarcity of ore, but there has been a little more demand, and on the west coast the Distington and Workington companies are putting additional furnace capacity to work.

As for hematite ore, business continues very difficult and Spanish rubio is quoted 29s. ($7.06) a ton, compared with 17s. ($4.14) a few months ago. There is excessive scarcity of boats and the position can hardly be relieved much until there is an alteration in this respect.

BARS AND TINPLATES HIGHER

Tin plates are booming on the rise in tin, and the increased cost of bars. Welsh bars are nearer £6 5s. ($30.42) than anything else, and the firmness of the market continues. A certain number of export permits for Sweden have been issued, but the trade with that country is looked at sideways by our Government.

According to the annual returns just issued by Lloyd's Register of Shipping there were last year 656 vessels of 1,683,553 gross tons launched in the United Kingdom, the output of mercantile tonnage showing a reduction of 248,000 tons on that of the previous year, which constituted a record. The blue ribbon was taken by the Clyde, which showed a total tonnage launched of 444,621 tons, followed by the Tyne with 315,585 tons, the Wear with 277,528 tons, Belfast with 239,819 tons, Middlesbrough with 137,156 tons and Hartlepool with 124,419 tons.

There is still an excellent demand for steel shipbuilding material of all kinds, and as has been already commented upon in these letters the main difficulty with which works are now faced is the scarcity of labor. Thanks to the Government issuing a badge intimating that the wearer is employed on national service, it has been possible to hold a certain number of men back from the camps, and employers are being asked not to encourage any further recruiting among their workmen, for we need far more men than are at present available to carry on the industrial life of the community. We are turning out enormous quantities of all kinds of war material, in addition to conducting the ordinary home trade and export business as far as is possible, but all efforts are clogged by the shortage of labor, which is hampering the discharge of vessels and is causing terrible congestion on the railroads.

AMERICAN WIRE RODS AND BARS

Some small American business has been done in wire rods and round bars, the latter being sold early this week at £7 1s. 6d. ($34.42) c.i.f. Glasgow and today at £7 8s. 6d. ($36.13) c.i.f. Glasgow, but it is doubtful whether the sellers would go on at this figure now, seeing that local prices are well above this, and that there seems no special object in throwing material away.

The rail trade has gone off a bit this week, but of late there has been a fair tonnage placed, and there are several Australian inquiries in the market. The Germans snap up what Scandinavian orders they can, and this is the only outlet for their mills in the overseas markets, though, by the way, they are supposed to be rolling rails for Turkey.

Metal Market

NEW YORK, February 17, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Feb.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
10	15.25	14.75	35.87½	3.80	3.67½	8.30	8.15
11	15.25	14.75	36.15	....	3.67½	8.50	8.25
13	15.25	14.62½	35.85	3.80	3.70	8.50	8.25
15	15.25	14.62½	36.25	3.80	3.70	8.75	8.50
16	15.25	14.62½	36.12½	3.85	3.72½	9.00	8.75

Electrolytic shows weakness, but Lake is held up by the great demand for it. Tin is quiet and large arrivals have created an easier tone. Lead is $1 per ton higher. Spelter is scarce and higher. Antimony is strong but not especially active.

New York

Copper.—It is agreed on all sides that electrolytic is dull and there is evidence of this condition in the complaints which are heard from the wire mills. The quotation yesterday was 14.62½c., cash, New York. It is understood that resale lots have been offered here and there at concessions, but it does not appear that any sales have been made. With Lake the situation is entirely different as the demand is large and persistent. The nominal quotation for prime Lake is 15.25c. and sales are said to have been made up to 15.75c. for prompt shipment of prime brands from New York stocks. The makers of prime brands are practically sold out for delivery this side of May and their present quotations are almost entirely on deliveries to be made after the opening of Lake navigation. Of course, it remains true that less favored grades can be had cheaper, in fact down to 14.50c., but the call is not for arsenical copper. The situation is summed up when it is said that the war is holding the market up. The customs authorities have resumed the announcement of exports from day to day.

Tin.—Only a small business has been done, and the general impression is that in view of the lack of demand and the generous quantities which are arriving, prices must follow a downward trend. At the same time there is considerable strength in the Far East and at London. The congestion of freight at London has not been relieved, which may account for the firmness there, but the trade is puzzled to know what is holding up the price in the Far East. The steamer City of Bristol, which arrived at Boston, February 13, brought 775 tons from Singapore and 600 tons from Penang. Arrivals this month total 1460 tons, and there is afloat 4115 tons. The cargo on the City of Bristol is believed to be the largest on record. About 75 tons will be discharged at Boston and the steamer will then come here. Inquiries for tin for export to Russia and Norway are increasing in number. The New York quotation yesterday was 36.12½c.

Lead.—The demand has abated to a considerable extent but the American Smelting & Refining Company yesterday advanced its quotation $1 per ton, or to 3.85c., per lb., New York. As a rule, sellers do not look with favor upon the advance as they say they cannot see the reason for it and are inclined to the belief that the bullish talk of buyers themselves is responsible for the action of the big interest. Practically all of the sellers are comfortably booked with orders. If the London price advances the new quotation here will hold,

otherwise a decline is looked for. The St. Louis quotation yesterday was about 3.72½c.

Spelter.—The situation is one where there are practically no sellers of spelter and as a matter of fact actual prices are more or less conjectural. For prime Western, 9c. New York, and 8.25c. is quoted. Brass mill special is quoted from 10c. to 12c. Aside from the scarcity, the chief feature consists of the export figures which show that in December 18,316 net tons of domestic spelter was exported and 1877 tons of foreign origin. In December, 1913, only 68 tons was exported. In the 10 months ended December, 1914, 64,802 tons of domestic spelter was exported against 7783 tons in the same time in the previous year.

Antimony.—It cannot be learned that sales for export have been large, but inquiries from abroad have operated to sustain quotations. English brands are nominally quoted at 20c. for Cookson's and 18.50c. to 19c. for Hallett's; other brands are quoted at 18c. to 18.50c.

Old Metals.—The market remains quiet and dealers' selling prices are unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	13.00 to 13.50
Copper, heavy and wire	12.50 to 13.00
Copper, light and bottoms	11.50 to 11.75
Brass, heavy	9.00 to 9.25
Brass, light	7.50 to 7.75
Heavy machine composition	11.50 to 11.75
Clean brass turnings	8.75 to 9.00
Composition turnings	9.75 to 10.00
Lead, heavy	3.45
Lead, tea	3.20
Zinc, scrap	5.50

Chicago

FEBRUARY 15.—Quotations for spelter to-day ascended to the high-water mark of 8.70c., Chicago. Few sales are reported in this territory. The copper situation remains practically unchanged, with the domestic demand light, and export business good. We have revised our prices and quote as follows: Casting copper, 14.50c.; Lake copper, 14.75c., for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 36.875c.; small lots, 39c.; lead, desilverized, 3.75c., and corroding, 4c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 8.70c.; sheet zinc, 10.50c.; Cookson's antimony, 22c., for cask lots; other grades, 18c. to 20c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 11.75c.; copper bottoms, 10c.; copper clips, 11.50c.; red brass, 10.75c.; yellow brass, 8.50c.; lead pipe, 3.10c.; zinc, 5c.; pewter, No. 1, 27c.; tinfoil, 32c.; block tin pipe, 35c.

St. Louis

FEBRUARY 15.—The nonferrous metal market has been still further excited as to Missouri products, lead and spelter, and dealers are cautious about making quotations and are avoiding committing themselves so far as possible. As nearly as can be ascertained from the present chaotic conditions lead commands about 3.70c. and spelter about 8.62½c., but no one will admit a willingness to sell at those figures. Tin is firm at 38½c.; Lake copper, 15c.; electrolytic copper, 14.90c.; Cookson's antimony, 20c. In the Joplin ore market the highest price ever paid for zinc blende was recorded, the top figure on settlement being $73 per ton, the basis range for 60 per cent. being $64 to $70.50 per ton. On calamine the basis range is $38 to $45 with the choicest lots running about $50 per ton. Lead ore was weak at $47 per ton. Shipments are heavy and there is much development work, the entire district being engaged in a mad race to put out all the ore possible at the present exceptional prices. On miscellaneous scrap metals we quote as follows: Light brass, 5c.; heavy yellow brass, 7c.; heavy red brass and light copper, 8c.; heavy copper and copper wire, 9c.; pewter, 20c.; tinfoil, 25c.; tea lead, 3c.; zinc, 3c.; lead, 3c.

The Norman W. Henley Publishing Company, 132 Nassau street, New York, has brought out a chart of value to operators of automobiles. It presents on a large scale, 24 x 38 in., a plan view of a typical six-cylinder chassis of standard design, the parts being clearly indicated that demand oil. The publisher's price is 25c. per copy.

Iron and Industrial Stocks

NEW YORK, February 17, 1915.

The registering of gains, a number of which are of a substantial character, was common to all of the leading stocks, in the past week. Notwithstanding the extreme conservatism with which investors are viewing the situation, because of the critical aspect of our commercial relations, on the eve of Germany's proposed blockade and Great Britain's anticipated retaliatory measures, American securities appear to enjoy the international confidence, to a greater extent than any others. There is, apparently, little or no selling pressure from abroad. The decline in exchange has proceeded to the point of being abnormal, a condition, not altogether satisfactory, even though indicating the favorable position of this country, and reports of the establishment of a credit for Great Britain to the amount of $100,000,000, appear likely to be followed, in the near future, by action of this sort. In the bond market there has been some contraction of what may be styled, over-the-counter buying, although, subscriptions to some recent municipal issues have been made freely and at normal prices. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week are as follows:

Allis-Chal., com	9	Lackawanna Stl.	28⅞ - 30
Allis-Chal., pref.	33 - 35	Pressed Stl., com.	29⅛ - 31⅞
Am. Can, com	27¾ - 29⅜	Pressed Stl., pref.	98
Am. Can, pref	93⅞ - 95	Republic, com.	19¾ - 21
Am. Car & Fdy., com.	44½ - 45⅞	Republic, pref.	75½ - 77
Am. Car & Fdy., pref.	113½	Rumely Co., com.	1¼ - 1½
Am. Loco., com.	21½ - 23	Rumely Co., pref.	4½ - 5⅛
Am. Loco., pref.	83	Sloss, com.	25½ - 26¾
Bald. Loco., com.	30 - 30½	Pipe, pref.	34
Bald. Loco., pref.	99 -100	U. S. Steel, com.	41¼ - 44⅜
Beth. Steel, com.	54⅝ - 57¾	U. S. Steel, pref.	103½ -105¼
Beth. Steel, pref.	104¾ -105¼	West'gh'se Elec.	69¾ - 71¾
Colorado Fuel	24¾ - 26⅝	Chic. Pneu. Tool.	48 - 50
Deere & Co., pref.	88⅝ - 89	Cambria Steel	42⅞ - 43⅛
General Elec.	141½ -143	Lake Sup. Corp.	9
Gt. No. Ore Cert.	30¼ - 34⅛	Warwick	9⅜
Int. Harv. of N. J., com.	96 - 96½	Cruc. Steel, com.	13¼ - 14¼
		Cruc. Steel, pref.	79½ - 80
		Harb.-Wk. Ref., pref.	97½ - 98½
		La Belle Iron, com.	27⅞ - 29

The Foreign Westinghouse Companies

Official announcement is made that negotiations are being closed whereby the Societe Anonyme Westinghouse, of Havre, France, and the Societa Italiana Westinghouse, of Genoa, Italy, are being transferred to the British Westinghouse Electric & Mfg. Company, Ltd., of Manchester, England. Guy E. Tripp, chairman of the board of the Westinghouse Electric & Mfg. Company, has denied that the transfers in any way are an outgrowth of the war and states that the British government had no connection with the transaction. According to Mr. Tripp, the English company has taken over the French and Italian companies as a matter of business policy and the American company by virtue of stock control in the English corporation will continue to dominate the other two companies. The French company has a capital of $5,000 000 and the Italian company of about $1,000,000. The British Westinghouse Electric & Mfg. Company, Ltd., was organized in 1899 with a capital of $7,275,000. The parent concern in this country holds more than half of the stock of all these companies.

Surplus Car Reports Resumed

The American Railway Association announces the resumption of the publication of idle freight cars and in its first statistical statement it gives a summary of freight car surpluses and shortages for February 1, the surplus being 227,473 cars compared with 211 960 cars on February 1, 1914, and with 127,325 cars on November 1, 1914, the nearest previous date for comparison. It is noted that in this report for February 1, 33 railroads operating 349,264 cars, sent in no returns as they did in November last. Had they done so it is estimated that the total surplus would have been about 277,000 cars. The report for February 1 is from 159 roads operating 1,854,150 cars, while the November 1 figures represented 192 roads operating 2,203,414 cars.

The total car shortage on February 1 is only 832 cars compared with 2229 cars on November 1, 1914, and 2282 cars on February 1, 1914.

Amalgamated Association Votes Against Wage Cut

Amalgamated association officials at Pittsburgh received on Wednesday morning, February 17, the result of the referendum vote taken by the men in the sheet and tin-plate mills that sign the Amalgamated scale on the proposed reductions in wages for sheet and tin mill labor, and the men have voted against accepting any reduction in wages, either in sheet or tin-plate mills. The men employed in the sheet mills voted almost unanimously against the reduction, while in the tin-plate mills the vote against the reduction was not so one-sided. The Amalgamated officials say they can do nothing further, but it is probable another conference with the sheet and tin-plate manufacturers will be held in a few days to consider the situation. Sheet and tin-plate mills that sign the amalgamated scale claim they must have reductions in wages to meet competition from non-union mills. It is not unlikely some of the union sheet and tin-plate mills will break away and operate on an independent basis.

Rogers Brown Anniversary Celebration

The thirty-fourth anniversary of the pig-iron firm of Rogers, Brown & Co. was celebrated at Cincinnati, Ohio, February 10 and 11. There were business sessions on both days, a banquet at the residence of D. B. Meachan in Avondale on the evening of February 10 and a luncheon at the Cincinnati Business Men's Club on February 11.

The following officers of the company were present: D. B. Meachan and J. K. Pollock, Cincinnati; Wm. A. Rogers and W. T. Shepard, Buffalo; A. A. Fowler, New York; W. C. Armour and E. L. Billingslea, Chicago. The following representatives and salesmen were also present: Geo. R. Sullivan. Philadelphia; S. W. Hubbard and Harwood Wilson, Cleveland; R. W. Clark, New York; F. J. Waldo, C. E. Maurer and A. F. Stengel, Buffalo; F. I. Foote, L. G. Colkins, Chicago; J. R. Darragh and W. P. Chaney, Pittsburgh; H. W. Fernald and R. E. Blazo, Boston; F. W. Bauer, Springfield, Ohio; J. C. Mears, St. Louis, and the following from the Cincinnati office: J. R. Houston, H. E. Turner, F. W. Miller, R. D. Meachan, F. S. Meachan, W. H. Knight, A. J. Wentworth, H. B. B. Yergason, J. J. Hoff and H. C. Lammers.

A Norwegian Electric Steel Plant

At the Stavanger Electro-Staalverk A. S., Jorpeland, Norway, scrap steel from nearby shipyards, which was formerly sold to England and Germany, is melted by producer gas in a 4-ton open-hearth furnace, according to an article in Metallurgical and Chemical Engineering. In about four hours the melted steel is transferred to a Roechling-Rodenhauser induction electric furnace and refined. The composition before and after is as follows:

	Open-hearth, per cent.	Electric, per cent.
Phosphorus	0.07	0.023 to 0.010
Sulphur	0.03	0.018 to 0.008
Carbon	0.10 to 0.15	As desired

Castings up to eight tons can be poured. A forging plant produces rods and other shapes. Ingots and billets are being shipped to Sheffield, England, where they are worked up into "Sheffield steel." Large quantities of steel are also going to England to be made into motor parts for aeroplanes and automobiles. A special quality of steel is made for hot stamping.

Southern Machinery Dealers' Meeting

The fourteenth annual convention of the Southern Supply and Machinery Dealers' Association will be held at the Piedmont Hotel, Atlanta, Ga., April 14, 15 and 16. The association has extended an invitation to the officers and members of the American Supply and Machinery Manufacturers' Association to attend the convention.

Book Reviews

Practical Iron Founding. By Joseph G. Horner. Pages, 409; 5½ x 7½ in.; illustrations, 283. Cloth. Published by D. Van Nostrand Company, New York. Price $2 net.

This is the fourth edition, revised and enlarged, of a work by an English author who has written four other books on allied foundry subjects. The object is to give a condensed account of the principles and modern practice of the iron foundry for both the student and the practical man. The author has succeeded in his attempt, especially in the new edition, which is double the size of that of the previous one because of the great changes in the industry. The section devoted to machine molding has been wholly rewritten with additional samples of molds and some new chapters. The increased subject matter has caused the work to become more than an elementary treatise.

The 16 chapters treat of sands and their preparation; cupolas, blast and ladles; the melting and testing of iron; molding boxes and tools; principles and examples of green sand molding; dry sand molding; cores; machine molding, etc. Excellent illustrations and designs add value to each chapter. An appendix of 20 pages contains valuable tables and data.

While entirely English in its scope it is possible that the American student or practical man can derive considerable benefit from it. He should, however, not take the table in the appendix of the average composition of pig iron as an example of American irons.

Poor's Analyses (First Series) and Poor's Summary of Investment News have just been issued by Poor's Railroad Manual Company, 535 Pearl street, New York. These two volumes are new and present in bound form the daily and weekly parts of Poor's Manual Service for the nine months ended December 31, 1914. The first volume relates to the operation of 41 corporations—railroad, public utility and industrial—so that estimates may be made of the value of the securities. The second volume is a reprint of the news items that appeared in the Daily Summary from April 1 to December 31, 1914, inclusive, presented in condensed form in alphabetical order for quick reference, supplementing the information in Poor's Manuals.

The safety and welfare work as carried on by the Youngstown Sheet & Tube Company, Youngstown, Ohio, is described by James M. Woltz, safety director of the company, in a 22-page pamphlet which reviews the progressive stages through which the movement has passed. Numerous illustrations show the use of guard rails to walkways, covers for gearing, and safety back ladders and the scheme for supplying an abundance of air for ventilation at the tube mill furnaces. Among the topics touched on are the means taken to educate foreign laborers and the experiences with signs, publications and lectures.

"Transactions of the American Institute of Chemical Engineers," Vol. VI, 1913, is out from the press of D. Van Nostrand Company, New York. It is an attractive volume of 268 pages, 6½ x 9¼ in., in cloth, and carries a portrait of the president of the society in 1913, M. C. Whitaker, of New York. The volume is made up principally of papers read at the Boston meeting of the Society in June, 1913.

Carborundum at the Panama Exposition

The Carborundum Company, Niagara Falls, N. Y., in designing its exhibit at the Panama-Pacific Exposition, opening this week at San Francisco, has adapted its product to the creation of a striking display. A central fountain, built of irregular masses of iridescent crude-carborundum crystals, rises to a hight of 10 ft. and over this a cascade of water will play. The flooring of the company's exhibit space is paved with carborundum and aloxite, and samples of the work for which these abrasives have been used, secured from all parts of the world, are tastefully displayed with appropriate description.

REPUBLIC COMPANY'S REPORT

Fiscal Report for the Year 1914 — Condition of Properties and Financial Position Satisfactory

The fifteenth annual report of the Republic Iron & Steel Company, just issued, reflects the restricted operations of the year ended December 31, 1914, in respect of both tonnage and value. Following is a comparative statement of income:

	1914	1913
Net earnings from operations after deducting charges for maintenance and repairs of plants amounting to $1,432,364.55 in 1914 and $1,654,573.30 in 1913	$2,330,672.83	$4,958,341.84
Interest and dividends received	76,879.45	66,940.50
Total profits for the year	$2,407,552.28	$5,025,282.34
Less provision for:		
Depreciation and removal of plants	$334,413.76	$600,887.61
Exhaustion of minerals	204,064.81	241,004.24
Possible shrinkage in value of raw materials		220,000.00
Total allowance for depreciation	$538,478.57	$1,061,891.85
Net profits for the year	$1,869,073.71	$3,963,390.49
Deduct interest on bonds and notes	840,325.56	862,090.43
Net profits applicable to dividends	$1,028,748.15	$3,101,300.06
Add surplus at December 31	6,512,777.64	6,661,477.58
	$7,541,525.79	$9,762,777.64
Deduct:		
Dividends on preferred stock	$875,000.00	$1,750,000.00
Special appropriations out of surplus	51,236.25	1,500,000.00
	$926,236.25	$3,250,000.00
Net surplus carried to balance sheet	$6,615,289.54	$6,512,777.64

As the result of the passing of the preferred dividends in the last half of the year, accumulated dividends on the preferred stock, including 1¾ per cent., payable January 1, 1915, aggregate 8¾ per cent. Net current assets December 31, 1914, were $10,752,361.33.

The low prices prevailing throughout the year coupled with the market reduction in tonnage of products sold combined to make this the period of greatest depression in the experience of the company. The gross volume of business, as indicated by the tonnage shipped, for the year ended December 31, 1914, was $21,366,249.35 as compared with $31,937,059.20 in 1913 and $32,319,774.36 in 1912.

A condensed statement from the balance sheet, December 31, 1914, is as follows:

Assets	
Cost of properties, including additions and investments	$70,188,257.16
Cash with trustee for bond redemption	89,840.75
Current assets:	
Inventory of manufactured products, material and supplies	7,779,439.91
Ore contract payments represented by ore on docks	864,991.14
Accounts and bills receivable after reserve for doubtful accounts	2,783,919.08
Cash	797,291.38
Total current assets	$12,225,641.51
Expenditure for mine stripping, advanced royalties, etc., chargeable to future operations	726,259.71
Total	$83,229,999.13
Liabilities	
Common stock issued	$27,191,000.00
Preferred stock	25,000,000.00
First mortgage bonds outstanding	81,000.00
Sinking fund mortgage bonds outstanding	13,305,000.00
Potter Ore Company bonds	283,000.00
Bonds on Martin & Palos Coke Wks. properties	264,000.00
Collateral Note due June 2, 1915	3,000,000.00
Dividend warrants, last instalment due Oct. 1, 1915	187,158.00
Current liabilities:	
Accounts payable	790,002.15
Cash received in excess of value of ore shipped to customers	244,080.17
Taxes accrued	261,402.11
Interest accrued	175,050.00
Unclaimed dividends	2,745.75
Total current liabilities	$1,473,280.18
Reserves:	
For exhaustion of minerals and mining equipment	$1,976,969.87
For depreciation and renewal of plants	3,088,021.31
For relining and rebuilding furnaces	269,069.44
For fire and accident insurance	291,168.70
For contingencies	205,042.09
Surplus	6,615,289.54
	$83,229,999.13

Comparative production tonnages for three years are summarized as follows:

	1914	1913	1912
Iron ore, gross tons	1,253,105	1,743,504	1,828,083
Coke, net tons	850,911	855,814	883,247
Limestone, gross tons	28,755	105,549	52,830
Pig iron, " "	777,811	895,949	1,035,593
Bessemer steel ingots, " "	391,826	611,833	682,285
Open hearth steel ingots, " "	371,409	347,488	354,008
Total steel ingots, " "	763,235	959,321	1,036,293
Finished and semi-finished products, net tons	760,054	989,620	1,078,804

Except for the by-product coke plant at Youngstown, completed early in the year, the list of the company's properties is unchanged from a year ago. Additions to the property account for the year aggregated $1,024,081.61, practically all of which covered charges for improved equipment in existing works.

For labor, a total of $7,587,267.69 was paid in 1914 or an average of $766 per man as compared with a total of $9,999,263.24 in 1913, and $792 per man. While a reduction is indicated in average earnings per man per annum, this showing is not due to a reduction in labor rates, but is largely accounted for by reduced output of the more highly finished products, the previous year's high labor rates having been maintained. The reduction in the working force during the year was approximately 21 per cent., but the total loss in wages from the various causes stated, aggregated 24 per cent. While some retrenchment in expenditures, on account of sociological work has been necessary, due to depressed business conditions, yet safety devices and other facilities, looking to the health and comfort of the workers, have been fully maintained.

In introduction, Chairman John A. Topping said:

The unsatisfactory condition of the iron and steel business, and the contributing causes mentioned in the semi-annual report of June 30, 1914, continued throughout the entire year, although there was some recovery during July and August, as was anticipated in the report last published. But immediately following the declaration of war abroad, general business (except that relating to munitions of war, which supplies, this company does not produce), was again upset. Both markets and finance became so generally demoralized and the future course of business so uncertain, that the Board of Directors authorized for issue a circular letter, dated September 15, 1914, notifying the stockholders of this company that they deemed it necessary to suspend payment of the regular quarterly dividend on the preferred capital stock. The wisdom of this action was justified by subsequent trade and financial conditions, as both earnings and the volume of business suffered a further decline, collections became congested, and, in general, the fiscal year ended December 31, 1914, was decidedly the worst in the history of the company, as to prices and demand, although earnings were considerably above previous periods of depression, due to lower costs, as a result of improved facilities and other economic influences, wages, however, not being reduced. The net earnings applicable to dividends for the year ending December 31, 1914, were $1,028,748.15. This profit was realized from production and shipments that represented a tonnage of approximately 66 2/3 per cent. of capacity, which, as compared with the preceding year of 1913, indicates a loss in tonnage of 25 per cent., and a shrinkage in value of 33 1/3 per cent.

The outstanding first mortgage and collateral trust sinking fund gold bonds, amounting to $613,000, were called October 1, 1914, under the option contained in the mortgage securing such bonds. Funds were deposited with the trustee under the mortgage, and all bonds have been surrendered and cancelled with the exception of 81 bonds which were outstanding as at December 31. Therefore, with the refunding operation now completed, the 10-30 year 5 per cent. sinking fund mortgage gold bonds become a first mortgage bond.

As to the physical condition of the company's properties, they were never so strong as at present, and the financial condition of the company is unquestioned, the balance of net quick assets being $10,752,361.33. This amount is sufficient for present working capital requirements and no financing is in contemplation, except as suggested by the maturity, June 2, 1915, of the collateral notes, to the amount of $3,000,000.

Pittsburgh and Wheeling Ore Rates

WASHINGTON, D. C., February 16, 1915.—The investigation recently undertaken, on its own initiative, by the Interstate Commerce Commission, to determine the reasonableness of existing rates on iron ore in carloads from Lake Erie ports to points in Ohio, West Virginia and Pennsylvania, and which has been consolidated with the cases of the Wheeling Steel & Iron Company vs. the Pennsylvania Railroad, and the Pittsburgh Steel Company vs. the Lake Shore & Michigan Southern Railroad, cannot be completed in time to permit new tariffs to be issued before the opening of navigation. This conclusion has been forced upon the Commission as the result of the material broadening of the original inquiry, and the necessity for securing certain information, for which a call has just been made upon the carriers. They have been requested to supply schedules covering a series of years and embracing rates on ore and handling charges at the Lake Erie docks, detailed maps showing the location of ore docks and locations at which ore is delivered on cars at points of origin, and the location of interchange docks, trestles and yards at which cars are delivered to consignees at destination. These schedules of inquiry are returnable February 28, but it is believed the carriers will ask, and will be allowed, further time in which to supply the data requested.

The investigation instituted by the Commission has already developed, in considerable detail, the contentions of the independent steel manufacturers with respect to this controversy. When the Pittsburgh Steel Company, in 1912, attacked the 96-cent rate then in force from Lake Erie ports to the Pittsburgh district, as a discrimination against that district, the rate to the Wheeling district was 60 cents, that to Columbus, 50 cents, and that to Zanesville, 55 cents. The railroads justified the Pittsburgh rate on the ground that it was intended to offset certain alleged natural advantages of the Pittsburgh district and to bring about an equalization of the transportation cost of the three raw materials, ore, coke and limestone, entering into the production of pig iron. The Commission condemned this method of equalization and ordered a removal of the discriminations complained of, whereupon the railroads raised the rate to the Wheeling district from 60 cents to 88 cents, an advance of 47 per cent., and reduced the Pittsburgh rate to 88 cents, a cut of about 8 per cent. Shortly after these tariffs were filed the Wheeling & Lake Erie and Pennsylvania railroads reduced their rates, to a part of the Wheeling district, from 88 cents to 70 cents, but made no change in the Pittsburgh rate. Assuming that the 60-cent rate to the Wheeling district, which had been in force for a considerable length of time, was regarded by the carriers as a reasonable charge, and having determined that the 96-cent rate was a penalty on the Pittsburgh district, the Commission undertook a general investigation to determine fair rates from Lake Erie ports to all the districts mentioned.

In statements made to the Commission on behalf of the independents, it is contended that the rates on ore may be gauged by the average revenue on all traffic on the defendant railroads, giving due weight to the great difference in expense between the transportation of low grade commodities and to the fact that ore, especially to the Pittsburgh and Wheeling districts, has a full return haul. It is asserted in this connection that the car-mile revenue on ore from the Lake to Pittsburgh at 60 cents per ton would yield nearly double the average car-mile revenue on all traffic throughout the United States, and nearly double the yield of the average of all freight on such systems as the Pennsylvania, the Lake Shore and the Baltimore & Ohio railroads. The railroads, it is asserted, receive more revenue per car-mile for transporting ore, in cars of the simplest construction, loaded and unloaded by the shipper, and loaded to full capacity, than they receive for a carload of the first three classes of freight for a haul from Pittsburgh to the Lakes, notwithstanding the enormous difference in cost between transporting ore and that of handling class freight. This great difference in cost, the independents assert, the Commission will find the carriers themselves have insisted on in the Rate Advance case, in which representatives of the railroads took the position that the low grade commodities were already bearing an undue proportion of the transportation burden at the rates then generally existing, and that, therefore, there should be an increase in the class rates.

All the tests which may fairly be applied to the rates on iron ore, the independents assert, will demonstrate that a rate of 50 to 60 cents for hauls of 125 to 150 miles, which have been fixed upon by the defendant railroads as the general rule, are reasonable charges, and that no higher rates ought to be imposed upon the Pittsburgh or Wheeling districts. It is further contended that the investigation will show that the Pittsburgh district, so far as the independent producers are concerned, not only bears the full force of the disadvantages in ore rates complained of, but receives no compensating advantages in the form of concessions on its output. In fact, it is asserted the Commission will find there are such manifest discriminations against the Pittsburgh district in the rates on finished and semi-finished steel products, such as bars, billets, hoops, bands, nails, etc., that Pittsburgh is shut out of the northwest market by rates favoring Cleveland and that its southern market is materially affected by high rates to Cincinnati, as compared with those from Chicago to that point. Many other similar inequalities are alleged to exist in the rates on raw material and finished products, with respect to other points. W. L. C.

Cambria Steel Company Improvements in 1914

The main improvements and additions made by the Cambria Steel Company, Johnstown, Pa., in 1914, consisted of the rebuilding of seven of its eight blast furnaces, construction of 114 by-product coke ovens, the building of additional stoves and blowing engines at its blast furnaces, and the erection of a new 9-in. mill for rolling small bars and special sections. Splendid time was made in the rebuilding of the blast furnaces, No. 1 stack being rebuilt in 78 days, No. 2 in 75 and No. 3 in 50 days.

The stack at No. 1 blast furnace, built in 1881, is 12 ft. 8 in. inside diameter and 15 ft. 8 in. outside diameter, 200 ft. high, supported by a stone foundation 24 ft. square, the top of which is 25 ft. above ground level. The stack is constructed of brick bound with wrought iron rail verticals, and bands of U sections at 30-in. intervals. Due to the gradual settling for years of the foundations of this stack, it was in May, 1913, 52 in. out of line, leaning over the boiler and engine house, and it was decided to straighten it without taking it out of service. This was accomplished in about four hours, without cracking the base plate or damaging the stack.

The company now has a total of nine batteries, or 420 by-product coke ovens. The 9-in. mill for rolling small bars and special shapes was designed by E. E. Slick, vice-president and general manager of the company, and contains some new features. It is equipped with a 30-ft. heating furnace and hot beds.

An extension was made to the car shops and additional machinery installed. New equipment and machines were added to the rod, wire and wire nail plant to give a greater diversification of product. A 6000-kw. turbo-generator for the electric power plant and electrical apparatus for other departments were added. The general transportation system was improved and simplified.

The Broderick & Bascom Rope Company, St. Louis, manufacturer of steel wire rope, operated with full force, last spring, to at least 85 per cent. of full time. Later in the year, it operated three-fourths time, but kept the entire day and night force. Finally, during part of October and all of November, it ran one-half time—still keeping all the men employed. During December the plant was operated full time, day and night, piling up large stocks but giving good size Christmas-time wage payments. Now, with improving conditions, the matter of employment, time, etc., is working itself out naturally, the company reports.

AGAINST TIME STUDIES

Rider to Army Bill of Importance to All Shops Having Scientific Management

WASHINGTON, D. C., February 16, 1915.—The House of Representatives has ordered the abolition of scientific shop management in the arsenals, navy yards and other establishments under the direction of the War and Navy Departments. If the Senate concurs in the action taken, the system will be permanently abandoned and, in view of the present parliamentary situation, it is more than probable that this body will acquiesce rather than jeopardize the budget bills, to which the prohibition has been added as a "rider." The Senate Committee on Military Affairs has stricken out the amendment put in the army bill by the House, but it will undoubtedly be offered on the floor of the Senate.

Meanwhile the War Department has ordered a return to the standard wage scale, which will mean a heavy loss to a large number of workmen, both skilled and unskilled. It is feared, however, that the employees are dominated by the unions to such an extent that either they will fear to address Congress on the subject or the protests of the workmen most vitally interested will be offset and rendered ineffective by indorsements of the pending legislation, given under more or less coercion, by their fellow employees.

The last three annual reports of Gen. Crozier, chief of the ordnance bureau, have contained facts and figures which have so strengthened the growing impression in favor of scientific management that members and senators have heartily approved the recent action of the Federal Industrial Relations Commission in undertaking an investigation of the matter and have deprecated any legislation until the commission should make its report. Hearings have already been had by the commission in this city and plans are on foot to visit the arsenals where the system has been installed and to make an exhaustive report on the subject before August 1 next, when the life of the commission terminates.

This arrangement not being satisfactory, however, to the opponents of scientific management, amendments to the army and navy appropriation bills were prepared and entrusted to pro-labor members of the House substantially as follows:

> Provided, That no part of the appropriations made in this bill shall be available for the salary or pay of any officer, manager, superintendent, foreman, or other person having charge of the work of any employee of the United States government while making or causing to be made, with a stop watch or other time-measuring device, a time study of any job of any such employee between the starting and completion thereof or of the movements of any such employee while engaged upon such work; nor shall any part of the appropriations made in this bill be available to pay any premium or bonus or cash reward to any employee in addition to his regular wages, except for suggestions resulting in improvements or economy in the operation of any government plant; and no claim for services performed by any person while violating this proviso shall be allowed.

This amendment was first offered in the House to the army appropriation bill by Representative Deitrick, Massachusetts. Against its adoption a point of order was made that it was new legislation which, under the rules of the House, can only be attached to an appropriation bill by unanimous consent. The point was disputed by the advocates of the rider, who contended that it was not new legislation but was merely a limitation upon the appropriation, and under much pressure from his colleagues, Representative Hay, Virginia, who made the objection to the rider, withdrew the point of order and the amendment was adopted without the formality of a division or roll call. The army bill carrying the rider was then passed, sent to the Senate and is now under consideration by the Committee on Military Affairs of that body.

The naval bill was then taken up, when Representative Buchanan, Illinois, another active labor member of the House, presented an amendment almost identical with that adopted for the army bill. Representative Mann, the minority leader, made the point of order against the entire provision, whereupon the chair ruled out the final clause, "no claim for services performed by any person while violating this proviso shall be allowed," but declared the amendment to be otherwise in order and after considerable discussion it was adopted.

The fate of these riders now rests with the Senate, the members of which have been supplied with much data gathered during the careful tests which have been made of the time study plan at Watertown and the premium system at both Watertown and Frankfort. In discussing the outlook General Crozier said to the correspondent of *The Iron Age:*

> We have suspended so-called scientific shop management at both Watertown and Frankfort arsenals in order to give our employees an opportunity to judge for themselves whether it is to their interest to retain the system and acquaint their representatives in Congress with the truth in regard to this matter. I feel sure that Congress would not abolish the system if it understood the facts and, therefore, I have been extremely anxious that action should be deferred until after the forthcoming report of the Federal Industrial Relations Commission, which is carefully investigating the subject, should be available. The sentiment that has been created against the system as utilized by the ordnance bureau is based upon statements in the main devoid of truth. It need only be said that the men work eight hours, under the best conditions, are granted 28 days annual leave in vacations and holidays and are well satisfied.

It is an open secret here that the plans of the labor leaders involve far more than the adoption of the legislation which has been attached to the army and navy bills. As in the campaign for an 8-hr. day, the promoters of this legislation intend to extend it at the earliest practicable date to prevent the Government from purchasing for any purpose the output of a plant in which scientific management is employed. The next step will be to incorporate such a provision in all the supply bills, so that contracts will go only to concerns able to file affidavits with the government's purchasing agents that no such systems are in force. W. L. C.

American Iron & Steel Mfg. Company

The annual report of the American Iron & Steel Mfg. Company, Lebanon, Pa., for the fiscal year ended December 31, 1914, shows the following balance sheet:

Assets

Current assets:	
Cash	$462,101.73
Accounts receivable	302,489.23
Inventory	1,232,738.29
Insurance and taxes value unearned	16,903.23
Capital assets:	
Plant and real estate	$7,648,088.78
Allowance for depreciation	1,105,000.00
Total assets	$8,557,321.26

Liabilities

Preferred and common stock	$5,550,000.00
Undivided profits	2,507,321.26
Bills payable	500,000.00
	$8,557,321.26

President James Lord in submitting the report commented as follows:

"Decreased demand, with very low prices, was a feature of the entire year. A loan of $500,000 was made on account of the electric steel plant, which has been under construction for the past eighteen months and now nears completion. The increase in real estate, plant, and equipment, amounting to $1,376,889.41, is principally due to the expenditures on the steel plant."

Chicago Meeting on Industrial Safety

The Chicago local council of the National Council for Industrial Safety held its February meeting at the City Club, Chicago, Tuesday, February 16. The address of the evening was presented by Arthur T. Morey, manager of the Safety and Fellowship Department of the Commonwealth Steel Company, Granite City, Ill., the subject being "The Relation of Accident Prevention to Successful Business." The usual round table discussion, of which H. P. Weaver was chairman, considered the social and economic effects of accidents, and the methods that have proved most satisfactory in inducing workmen to use protective devices.

PERSONAL

Kurt Orbanowski, formerly in charge of the Putiloff shipyards in Russia, and Jacob Eton Conner, for a number of years American consul at Petrograd, Russia, are in this country looking into the purchase of tin, lead, spelter and other metals and materials for export to Russia. They are making their headquarters at the office of the Ingersoll-Rand Company, 11 Broadway, New York.

At the annual meeting of the Fairbanks Steam Shovel Company, Marion, Ohio, held recently, J. G. Fairbanks was elected president and general manager; O. P. Lennox, vice-president; C. W. Fairbanks, secretary and treasurer.

E. M. Breed, for the past eight years district manager of the Canadian Allis-Chalmers, Ltd., with headquarters at Vancouver, B. C., has been appointed district manager of the Pelton Water Wheel Company, also with headquarters at Vancouver. He is a graduate of the University of Maine, College of Technology, and is a member of the American Institute of Electrical Engineers. He was at one time a member of the sales force of the Canadian Westinghouse Company at Montreal.

M. F. Findley has been placed in charge of a sales office which the West Leechburg Steel Company, manufacturer of strip steel, has established in Detroit, Mich., in the Dime Savings Bank Building.

E. O. Oeters has been appointed Eastern representative of the Electrical Alloy Company, Morristown, N. J., maker of wire and ribbon resistance materials, and it has opened offices at 30 Church street, New York, in the Bourse, Philadelphia, and in the Equitable Building, Baltimore.

Joseph T. Ryerson, vice-president Joseph T. Ryerson & Son, is making his headquarters at the Chicago general offices, for about a month. E. L. Ryerson, Jr., vice-president and works manager, will be at the New York office from February 15 to 28, to superintend the carrying out of the contracts for the construction of the new Ryerson warehouses at Jersey City.

E. H. Bardes, president Bardes Range & Foundry Company, Cincinnati, Ohio, was elected a member of the trade expansion committee of the Cincinnati Chamber of Commerce, at a meeting held at the Hotel Gibson, Cincinnati, on the evening of February 10.

William M. Starrett, of the McClintic-Marshall Company, Pittsburgh, who has been in charge of the steel construction work of that company at Panama canal, has returned from a trip to the Isthmus.

Henry Jaxtheimer has been elected safety engineer at the plant of the Sharon Steel Hoop Company, Sharon, Pa. This is a new position the company has created as the result of recent compensation and accident legislation.

C. H. Wilcox, formerly president of the Great Western Tin Plate Company, Joliet, Ill., has been appointed treasurer of the Hoyt-Noe Steel Company, Chicago.

Eduardo DeA. Braga, who has been in this country as special delegate of the Ministry of Agriculture and the Ministry of Public Works in Brazil for more than a year past, returned to that country on the Sao Paulo Thursday last, February 11. He is to represent the United States Purchasing Corporation with headquarters at Rio de Janeiro.

E. D. Wright, Cooperstown, Mich., has become associated with the Tiger Fence Company, Waukesha, Wis. He has been vice-president for some years and now takes an active share in the management with Charles Baxter, president.

P. P. Mirtz, mechanical engineer of the Lake Shore & Michigan Southern Railroad, Cleveland, Ohio, has been appointed assistant engineer of the New York Central Lines under the chief mechanical engineer, R. B. Kendig, with headquarters in New York City. This change has resulted from the consolidation of the Lake Shore with the New York Central. While no official announcement to that effect has been made, it is expected that the purchase of mechanical equipment for the portion of the railroad system heretofore operated as the Lake Shore will be purchased for the most part in New York.

S. W. Hubbard, manager of the Cleveland, Ohio, office of Rogers, Brown & Co., has started on a six weeks' trip to the West Indies.

John S. Huey has been appointed district sales agent for Louisiana and southern Mississippi by the Kerr Turbine Company, Wellsville, N. Y. He was formerly connected with the Allis-Chalmers Company and later with Woodward Wight & Co. His office will be at 418 Hibernia Bank Building, New Orleans, La.

W. P. Snyder, president of the Shenango Furnace Company, Pittsburgh, has gone to Palm Beach, Fla., to remain until about April 1.

James A. Farrell, president of the United States Steel Corporation, delivered an address at the forty-seventh annual dinner of the Newark, N. J., Board of Trade on the evening of February 16.

Brier Hill Steel Company Finances

Offerings of the $2,000,000 bond issue of the Brier Hill Steel Company, Youngstown, Ohio, now being made in Cleveland and Youngstown, has brought out a statement of the financial standing of the company, here subjoined. The authorized preferred stock is $5,000,000 and common $10,000,000. The bond issue of $2,000,000 may be followed shortly by another issue of $1,000,000, which has lately been authorized by the board of directors, and both issues are a first claim on the plants of the company, consisting mainly of two blast furnaces, an open-hearth steel works at Youngstown and two large black and galvanized sheet mills at Niles, Ohio. The condensed balance sheet of the company as of December 31, 1914, is as follows:

Assets

*Plant and property	$9,189,179
Invest. and adv. to sub. companies	4,771,643
Cash	280,146
Bills and accts. receivable	734,734
Inventory	2,997,231
Deferred assets	268,585
Total	$18,241,519

Liabilities

Bonded debt	$2,000,000
Current bills	520,000
Accounts payable	703,596
Accounts	40,891
Reserves	117,049
Preferred stock	4,940,200
Common stock	9,155,712
Surplus	764,070
Total	$18,241,519

*After deducting $200,000 bonds of subsidiary companies.

Large Increase in Steel Corporation Orders

The regular statement of the United States Steel Corporation of unfilled orders on its books January 31, 1915, shows a total of 4,248,571 tons, as compared with 3,836,643 tons on December 31, 1914. This is a gain of 411,928 tons and is from 150,000 to 200,000 tons more than the average estimate of the trade. On January 31, 1913, the unfilled tonnage was 7,827,368 tons. The following is a statement of unfilled tonnage for each month, beginning with the high point of December 31, 1912:

January 31, 1915	4,248,571	December 31, 1913	4,282,108
December 31, 1914	3,836,643	November 30, 1913	4,396,347
November 30, 1914	3,324,592	October 31, 1913	4,513,767
October 31, 1914	3,461,097	September 30, 1913	5,003,785
September 30, 1914	3,787,667	August 31, 1913	5,223,468
August 31, 1914	4,213,331	July 31, 1913	5,399,356
July 31, 1914	4,158,589	June 30, 1913	5,807,317
June 30, 1914	4,032,857	May 31, 1913	6,324,322
May 31, 1914	3,998,160	April 30, 1913	6,978,762
April 30, 1914	4,277,068	March 31, 1913	7,468,956
March 31, 1914	4,653,825	February 28, 1913	7,656,714
February 28, 1914	5,026,440	January 31, 1913	7,827,368
January 31, 1914	4,613,680	December 31, 1912	7,932,164

OBITUARY

WILLIAM EDGAR ALLEN, manufacturer of tool and alloy steels, of renown in this country as well as abroad, died January 28, at Whirlow House, Sheffield, England. Fortified with a liberal education and an experience gained during an extended sojourn on the Continent, Mr. Allen in 1868 founded the firm of Edgar Allen & Co., Imperial Steel Works, Sheffield. The business of this company, which began with the manufacture of steel and files, rapidly expanded, particularly on the Continent, and led the organization into the manufacture of railroad supplies. The development of manganese steel castings followed later, while special manganese steel track work still reflects the impetus given it by Edgar Allen. Subsequently Edgar Allen & Co., Ltd., became famous for the high speed steel associated with that name and a world business was built up, to which the existing offices of the company at New York and Chicago bear witness. An illness of several months preceded Mr. Allen's death, his advanced age of 77 years contributing. He was much interested in music and art and occupied a large place as a benefactor of the educational and charitable institutions of Sheffield.

HOMER P. GOFF of the firm of Goff, Horner & Company, Oliver Building, Pittsburgh, committed suicide in his office on Sunday, February 14, caused, it is said, by despondency due to long ill-health. Mr. Goff was born in Pittsburgh and was graduated from the University of Pittsburgh. For some years he was a member of the firm of James Collard & Co., pig-iron brokers, afterwards engaging in business on his own account with offices in the Lewis Building. Later he formed a partnership with W. Stewart Horner as iron and steel brokers under the name of Goff & Horner. The firm later admitted George S. Phillips as a member, and the name was changed to Goff, Horner & Co. For some years it operated the Pittsburgh Pulley Company at Crafton, Pa., of which Mr. Goff was president, and it owns the Pittsburgh Shovel Company operating a plant in the manufacture of shovels at Leechburg, Pa. Goff, Horner & Company are also the selling agents in the Pittsburgh district for the American Rolling Mill Company, Middletown, Ohio. Mr. Goff for some years was president of the First National Bank of Crafton and the Crafton Trust Company, but resigned these positions several years ago on account of his health. He was a member of the Union Club and the Pittsburgh Athletic Association. He is survived by his widow, two sons and four daughters.

LYDELL WHITEHEAD, president of Whitehead Brothers Company, Providence, R. I., died at his home in New York City on February 4, aged 58 years. He had devoted his life-time to the selection and production of foundry sand and clays, and for 42 years was connected with the business acquired by Whitehead Brothers Company. He had been its president since the present company was incorporated in 1882. He leaves a wife, daughter and one son, William Whitehead, 2nd, who is connected with the Whitehead company.

JAMES STANTON EARLY of the firm of W. J. Early & Sons, Ltd., operating a foundry on the south side, Pittsburgh, died at his home in Knoxville, a suburb of Pittsburgh, on Saturday, February 13, of pneumonia. Mr. Early was a member of the Masonic Fraternity and is survived by his widow and three sons.

ADAM W. BLAIR, for thirty-five years foundry superintendent of the West Milwaukee locomotive and car shops of the Chicago, Milwaukee & St. Paul, died February 11 after a long illness with stomach trouble, aged 69 years.

GEORGE ALEXANDER LEWTHWAITE, head of the G. A. Lewthwaite Company, makers of machinery and tools, 116 Walker street, New York, died of pneumonia, February 16, at his home in New Rochelle, N. Y. He was 38 years old.

LLEWELLYN H. ALLEN, vice-president of the South Side Malleable Casting Company, Milwaukee, died February 7 after a short illness, aged 48 years.

German Pig-Iron Output in 1914

The war's effect on Germany's output of pig iron is forcibly illustrated by the statistics just published in Stahl und Eisen. The production for 1914 amounted to 14,389,547 metric tons, against 19,309,172 tons in 1913, a decrease of 4,919,625 or 25.48 per cent. The output in 1912 was 17,868,909 tons. The first seven months of 1914, just previous to the war, showed a decline of 374,881 tons from the same period in 1913, reflecting a retrogression in prosperity. The following table gives the monthly production for each month of 1913 and 1914, in metric tons:

	1913	1914		1913	1914
Jan.	1,611,345	1,566,505	Aug.	1,640,016	586,661
Feb.	1,493,877	1,445,511	Sept.	1,590,849	580,087
Mar.	1,629,463	1,602,896	Oct.	1,653,051	729,822
Apr.	1,588,701	1,534,429	Nov.	1,588,985	788,956
May	1,643,069	1,607,193	Dec.	1,611,250	853,881
June	1,609,748	1,531,313			
July	1,648,818	1,564,345	Total	19,309,172	14,389,547

Examination of these figures shows that while the decrease due to the war has been tremendous, there has been a steady advance with each month since September. Comparing the output of each month of the war with the corresponding month of 1913, the percentage of output in September was 36.46 per cent. of that of the same month in 1913; for October, 44.15 per cent.; for November 49.65 per cent.; and for December 52.99 per cent.

The production as to grades of iron for 1913 and 1914 was apportioned as follows:

	1913	1914
Foundry	3,657,326	2,494,527
Bessemer	368,840	237,988
Basic	12,193,336	9,289,989
Steel-making and spiegeleisen	2,599,887	1,996,786
Forge	489,783	370,257
Total	19,309,172	14,389,547

Bessemer pig iron showed the largest percentage of decline, 35.4 per cent., while the decrease in foundry iron was 31.7 per cent. In districts the Rhenish-Westphalia was first with 6,610,119 tons in 1914 and 8,209,157 tons in 1913. In second place was Lorraine and Luxemburg, credited with 4,267,573 tons in 1914 and 6,417,727 tons in 1913, this district suffering the largest decrease from 1913, 33.5 per cent. The Saar district showed a reduction in 1914 from 1913 of 30.3 per cent. with the Siegerland and Hessen-Nassau district third with a 29.4 per cent. decrease.

German Steel Works Union on Trade Conditions

The statement of the German Steel Works Union, issued after its regular general meeting on January 21, 1915, gives the following general review of the condition of the German steel trade.

In semi-finished material specifications from domestic consumers showed little essential change from those of the last few months, and should hold their own in the next few months. From neutral countries several further large orders have appeared.

In railroad permanent way material the Mecklenburg-Schwerin and the Oldenburg State railroads have placed their orders for the current year, but they are in each case considerably less than last year. Several rather voluminous sales have been made to neutrals. In mine rails specifications were better in December than in November. The receipt of foreign orders for mine rails have been relatively few. In grooved rails domestic orders have been made to neutral countries at reasonable prices.

In shapes a decline has been manifested in December which is usual at this time of the year because of inactivity in building trades during the winter. The condition of this branch of the steel trade cannot be ascertained until the building season commences again. Relations with foreign countries have not changed much since the last report, and business is confined almost entirely to contiguous neutral nations.

The next regular meeting will be held on Thursday, February 25.

Pittsburgh and Nearby Districts

The Warren Tool & Forge Company, Warren, Ohio, is filling a large number of orders for export, two of which are for shipment to Sydney and Melbourne, Australia. A shipment of hoes, mattocks and picks was recently made to France. The company is making a combined hoe and pick for the French Government. It also shipped recently a large order of mattocks to Brisbane, Australia, and 500 special 3-ft. crow bars on a standing order from an automobile builder in Cleveland, Ohio. These special bars are used in equipping automobiles for export. Recently the London, England, representative of the Warren Tool & Forge Company sent in an inquiry for 50,000 to 100,000 infantry tools, presumably for the English army.

Recently the American Steel Company, Park Building, Pittsburgh, purchased at forced sale the plant of the Sunshine Coal & Coke Company in the Connellsville region, and on February 9 it organized a new company known as the American-Connellsville Coal & Coke Company. The new concern expects to put in operation about 400 ovens on March 1. The officers are: Eugene S. Reilly, president; W. F. Soisson, vice-president; J. P. Kelly, secretary, and M. B. Kelly, treasurer. The main offices are in the Park Building, Pittsburgh.

Stockholders of the Youngstown Sheet & Tube Company, Youngstown, Ohio, have re-elected J. A. Campbell, president; H. D. Dalton, Cleveland, first vice-president; C. S. Robinson, second vice-president, and Richard Garlick, treasurer.

The Pittsburgh Filter Mfg. Company has received a contract from the Sedalia Water Company, Sedalia, Mo., for a 3,000,000-gal. mechanical filter plant. This work is designed and is to be supervised by Chester & Fleming, engineers, of Pittsburgh.

The Johnstown Forge, Machine & Moter Car Company, Johnstown, Pa., has been organized to do general repair, sheet and metal work. James J. Zimmerman has resigned as foreman of a department of the Cambria Steel Company to become the head of the new concern.

The top of the stack of the Struthers Furnace Company, Struthers, Ohio, fell in last week and the furnace is being shoveled out. It is expected to be in blast again on or before March 1.

The H. Koppers Company, Chicago, builder of the Koppers by-product coke ovens, has leased the ninth and part of the tenth floors of the First-Second National Bank Building, Pittsburgh, and is to move its general offices from Chicago to Pittsburgh as soon as necessary alterations are made.

The American Erectors' Association, recently organized and composed of concerns in the Pittsburgh and eastern Ohio districts doing heavy plate work, has opened an office in room 605, Benedium-Trees Building, Pittsburgh. J. W. Poushey, who is secretary of the National Erectors' Association, is also secretary of the American Erectors' Association.

The Ohio Corrugating Company, Warren, Ohio, recently incorporated with a capital of $50,000, expects to have its plant in operation about May 1. It is preparing to let contracts for its building construction and equipment, but it is now in position to make shipments on roofing and siding, corrugating sheets, stovepipes, wall ties, eaves trough and conductor pipe, metal shingles, black and galvanized and stovepipe blue sheets, bright coke and charcoal tin plate, open-hearth ternes and steel ceilings. The officers of the company are: W. Manning Kerr, president and treasurer; C. H. Reigel, vice-president and manager, and I. A. Foltz, secretary and manager of sales.

The Westinghouse Electric & Mfg. Company has made application to the New York Stock Exchange for permission to list additional stock. The company has issued a financial report for the nine months ended December 31, 1914, showing sales of $26,278,076 and net income of $1,354,166. The Westinghouse Machine Company reports for the same period sales billed amounting to $3,576,399, an operating loss of $54,947, and a net loss of $335,342.

It is reported that an inquiry has been received in Pittsburgh for 1,000,000 10½-in. 76-millimeter drop-forge shells for the British army. The order represents an outlay of $4,000,000.

The Republic Iron & Steel Company, Youngstown, Ohio, has started up 240 coke ovens at its Martin works in the Connellsville region.

Within the next week or 10 days the Youngstown Iron & Steel Company, which is to build an open-hearth steel plant at Lowellville, Ohio, is expected to place contracts for the furnaces, blooming mill and sheet bar mills and other equipment.

The Carnegie Institute of Technology, Pittsburgh, has discontinued registration for the current college year, the various departments now having all the classes that can be efficiently handled. The number of students now in the institution is 3223.

The Mercer, Pa., works of the American Sheet & Tin Plate Company is now operating six days per week for the first time in some months.

Stockholders of the Alliance Structural Company, Alliance, Ohio, have re-elected directors, and the directors organized by electing G. W. Shem president, G. G. King secretary, M. S. Milbourne treasurer, and R. J. Hier vice-president and general manager. The company is capitalized at $200,000, and intends in the near future to about double the capacity of its plant.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has blown in another furnace, making three out of four in blast, and gives the company an output of about 1500 tons of metal per day.

At Pittsburgh last week, the jury in the case of four former employees of the Carbon Steel Company of that city, charged with conspiracy to defraud the government in the manufacture of steel for Panama canal work, disagreed and was discharged. It is probable the suit will come up again later.

It is stated that fair progress is being made in the proposed merger of the LaBelle Iron Works, Steubenville, Ohio, and the Wheeling Steel & Iron Company, Wheeling, W. Va., which also owns the Wheeling Sheet & Tin Plate Company at Yorkville, Ohio. The matter will probably be definitely decided at a meeting of the board of directors of the LaBelle Iron Works to be held in Wheeling on March 9.

Increased Charges for Removing Waste Materials

A hearing was held in Pittsburgh on Monday, February 15, before George T. Bell, examiner for the Interstate Commerce Commission, on the proposed charge by the railroads for loading into cars and the removal of refuse material from sidings of blast furnaces and other industrial plants in the Pittsburgh district. The railroads have placed a charge of 20 cents per ton for the removal of slag, flue dust, clean ashes and refuse molding sand, for which there had previously been no charge. For the removal of brickbats, dirt and other refuse material or of ashes mixed with refuse, the railroads have heretofore charged 25 cents per ton, but now propose to increase this to 35 cents. A number of railroad officials and also traffic managers of large industrial concerns in the Pittsburgh district testified at the hearing, claiming that the railroads use this material for filling purposes and that there should be no charge for hauling it. The meeting was continued on Tuesday, but no definite decision was reached.

Iron and Steel Institute's Annual Meeting

Announcement is made that the annual meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers, London, May 13 and 14, 1915. The annual dinner is provisionally set for May 13. It is contemplated to hold the regular fall meeting in London in the week ending September 25, 1915.

The American Iron, Steel & Heavy Hardware Association will hold its sixth annual convention at the St. Francis Hotel, San Francisco, May 25 to 28. Arrangements are being made for special train by the secretary, John G. Purdie, Marbridge Building, Broadway and Thirty-fourth street, New York City.

Machinery Markets and News of the Works

The demand for machine tools for export and for the manufacture of munitions of war in this country holds up in an excellent manner, but still more encouraging is a general betterment in miscellaneous domestic directions. Makers of automobiles are showing more activity and a few railroad inquiries are noticed. Purchasing is extending gradually to types of machines for which there has been but little call in recent months. In New York war business predominates, but orders which cannot be associated with this class of trade are increasing. Manufacturers of mill and machinists' supplies report a better demand for their products in New England and a general improvement is felt generally. The volume of sales in Detroit has been fair, the demand coming principally from makers of automobiles and accessories. Cleveland reports buying by automobile makers and two inquiries from railroads which the trade is glad to see. While makers of some kinds of machine tools in Cincinnati are busy, trade is not brisk with the builders of shapers and radial drills. Operations have been on a better scale in Chicago, due both to domestic as well as foreign inquiry. The foundry business is more active in Milwaukee, where the principal demand for machine tools is coming from abroad rather than from domestic manufacturers. Activity is somewhat better in the Central South, but the greatest demand is for repairs. Birmingham presents no special features. Texas conditions show some improvement. Purchasing in St. Louis indicates a conservative expansion. In the Pacific Northwest marine repair work is active and interest in special lines of equipment is livelier, partly because of the big demand for lumber for export.

New York

NEW YORK, February 16, 1915.

The trade continues to draw encouragement from the fact that it is booking more orders which cannot be associated in any way with war business. So far as large propositions go, however, the demand which springs from the activity in munitions of war continues to be by far the most fruitful. Among the Canadian purchasers is listed the National Steel Car Company, Hamilton, Ont., which recently bought about 60 second-hand engine lathes, as well as a quantity of new tools. The E. W. Bliss Company, Brooklyn, has again been in the market, this time buying a number of gear-generating machines and a larger number of drilling machines. The purely domestic purchases are scattered and do not run into large sums. One of the best was a recent purchase by the American Radiator Company.

More concerns are now making shrapnel than at any time heretofore, but they are saying little about it. A proposition now pending calls for the making here of an 18-lb. shell for England, many of which are being made in Canada.

Walter C. Clark, who recently resigned from the sales department of the Niles-Bement-Pond Company, New York, is now connected in a consulting capacity with the recently established purchasing department of J. Pierpont Morgan & Co. As already mentioned in *The Iron Age*, the new department of the banking house will purchase war supplies for the British Government, for which it is commercial agent. Mr. Clark's connection with the Niles-Bement-Pond Company covered a period of about 31 years. Prior to the consolidation of the several interests now embraced by the company he was eastern manager of the Niles Tool Works, Hamilton, Ohio. For a number of years he was vice-president of the company and in charge of machinery sales. In his present connection he will give to the banking house the benefit of his long experience in matters pertaining to metal-working machinery and kindred equipment.

Joseph T. Ryerson & Son, 30 Church street, New York, recently received a large order for machinery and steel for the manufacture of explosive shells. This company also sold recently seven lathes, for shipment to France, and one of its large friction saws. The buyer of the latter is a domestic arms manufacturer, which will use the machine for cutting steel from which rifle barrels are to be made.

The Tropenas Converter Company, 50 Church street, New York, issued to-day list No. 3 of tools for shipment to France. Second-hand machines will be considered, if in good condition. Prompt delivery is asked, and specifications are, in brief, as follows:

Two plain lathes, 240 to 500 mm. swing and 1000 to 2500 mm. centers.

Six gap lathes, back-geared automatic cross feed, 1200 mm. bed and 300 to 360 mm. swing, with countershaft, etc., and accessories.

One turret lathe of about 1500 mm. bed and 324 mm. swing, turret with six holes, countershaft and accessories.

Two quick-acting, universal milling machines, for brass and composition, table 500 x 800 mm., vertical displacement about 350 mm. and horizontal displacement about 300 mm., and various accessories.

The Allied Machinery Company of America is doing a good business through its foreign branches in France, Switzerland and Italy.

Inquiry has recently been sent out for additional shearing machinery, a vertical turret lathe and some miscellaneous tools required by the General Electric Company, Schenectady, N. Y.

The Mulliner-Enlund Company, Syracuse, N. Y., has been incorporated to manufacture machinery, tools, dies, etc. A. E. Mulliner, A. M. Enlund and H. J. Crane are the incorporators.

The Shevlin Engineering Company, Corona, N. Y., has been incorporated by J. J. Shevlin, 24 Warren street, J. J. Jones and J. P. O'Neil, to construct and erect tanks, stacks and steel work.

The Ford Marine Appliance Corporation, 290 Broadway, New York, has been incorporated to manufacture mathematical instruments and electrical navigating instruments. Jules Breuchaud is president, and H. C. Ford, vice-president.

The George W. Brownyard Company, manufacturer of metal-covered fire-proof doors and windows, Rochester, N. Y., has been incorporated to take over an existing business and plant. G. W. Brownyard is president and H. S. Day, secretary.

The Fedders Mfg. Company, Tonawanda street and West avenue, Buffalo, N. Y., manufacturer of radiators for automobiles and motor boats, will build an addition to its plant.

The State Canal Board, Albany, has accepted the plans of the Seneca Falls Power Corporation, Seneca Falls, N. Y., for the construction of a hydroelectric power plant at Seneca Falls, capable of developing 7500 hp. in 10 hours. Ernest G. Gould, Seneca Falls, is a leading stockholder in the corporation.

The New York Construction Company, 1328 Broadway, New York City, and the Woolley-James Company, Rochester, have been awarded contracts aggregating about $10,000 for making alterations in the electric powerhouse at the New York State Soldiers' and Sailors' Home, Bath, N. Y.

The Eastern States Package Company, Buffalo, N. Y., has incorporated with a capital stock of $75,000 to manufacture splint and bamboo baskets and will operate plants in Buffalo, Philadelphia and some New England point. R. G. Williams and Bradley H. Phillips, Ellicott Square Building, Buffalo, are directors.

The Wemlinger Steel Piling Company, 11 Broadway, New York City, has had plans completed for a manufacturing building 50 x 120 ft., one story, which it will erect at Kingston, N. Y., at a cost of about $40,000.

The Chapin-Owen Company, Rochester, N. Y., has filed incorporation papers for the manufacture of athletic and sporting goods, automobile supplies, etc., with a capital stock of $25,000. C. T., and C. H. Chapin and C. S. Owen are the incorporators.

The Rome Wire Works, Rome, N. Y., has let general contract to the Rome Cement Stone Company for a small addition to its manufacturing plant. M. Potter is general manager.

Ground is to be broken this week for the plant of the Elba Food Products Company, Elba, N. Y. The main factory will be 110 x 375 ft., and the powerhouse 52 x 73 ft. Raymond M. Decker, Batavia, N. Y., the president, is now purchasing machinery for the plant.

New England

BOSTON, MASS., February 16, 1915.

Manufacturers of the many articles which are classified as mill supplies and "machinists' supplies," the latter being a subdivision of the first, are having a better business. No barometer exists more significant in its indications than the orders and inquiries of these branches of industry, because their product is a necessity in every shop, mill and factory. Inquiry in a rather comprehensive way among these houses demonstrates that the last few weeks has developed a most encouraging change in the market.

The small tool industry illustrates the point. For example, the tap and die manufacturers of Greenfield, Mass., the center of this division of business, are unanimous in the statement that the last month has shown what they believe to be a healthy improvement, as indicated by orders and increasing number of inquiries. Moreover, where a greater part of the production has consisted of special taps and dies—undoubtedly for purposes directly traceable to the manufacture of war materials—current business averages a much more nearly normal character. In other words people are buying for reasons of construction instead of destruction.

Better still, the improvement appears to average a very general one. Manufacturers of all sorts of products, outside of as well as in the metal lines, make the same report. A good deal is heard of low stocks everywhere; everyone knows that this condition exists. It is pleasant, also, to hear of "repeat orders," following those which had been disappointingly small, and that deliveries under contracts have been called for earlier than had been anticipated.

The wire industry in Worcester maintains the gain which had its beginning in the early weeks of the year. The last quarter of 1914 had been very dull. The January improvement was most marked, and the first half of February has shown even better conditions. The demand seems a healthy one, with an increasing percentage of orders that cannot be traced to the war. In Worcester the independent companies as well as the American Steel & Wire Company agree practically in their reports of the situation. The mills are not up to capacity, and certain lines of product are somewhat weak, including electrical goods; but the conditions are better than they have been for months. It would require no very great gain to put the industry on a 100 per cent. basis.

In Springfield, Mass., the machine tool builders are busy. The Baush Machine Tool Company is operating at full capacity on orders from customers covering a variety of industries. The Van Norman Machine Tool Company, manufacturer of grinding machines and milling machines, has been busy for months, and no diminution in actively is indicated. The builders of machines for other purposes than fashioning metals, of whom there are a number in Springfield and vicinity, are variously affected by existing business conditions. Perhaps it is fair to state that they are doing fairly well on an average; because several are dull and several are very prosperous.

The New England builders of wooden ships are experiencing more than usual prosperity, their business responding to the general demand for additional American vessels which has resulted from the war. At Bath, Maine, the chief eastern center for this branch of the shipbuilding industry, a number of vessels have been laid down, or are promised to the yards. The modern wooden ship is well equipped with mechanical appliances for handling cargo, anchors, etc., and auxiliary power is in common use, so that the machine shops will share in these investments.

The Rivett Lathe & Grinder Company, Faneuil, Mass., has added to its line a hand-operated small hole grinding machine, designed for the dry or wet grinding of work such as bushings where the operation is so short that the hand machine is more economical than one that is mechanically operated. The new machine is constructed upon the same standard of accuracy as the company's previous types; but the simplification resulting from dispensing with mechanical features decreases the cost proportionately. Included in the equipment is an improved countershaft, with belts to work spindle, water pump and the grindle spindle countershaft. The work head and pump are controlled by a pedal, which not only shifts the belts to the idle pulleys, but applies a brake.

The Seth Thomas Clock Company, Thomaston, Conn., contemplates the erection of a large factory building in the spring.

The Wallace Barnes Company, Bristol, Conn., manufacturer of springs, has awarded the contract for the rolling mill which will be erected in Terryville. The building will be of brick, with steel trussed roof, and will be 80 by 160 ft. A boiler house will be 30 ft., square.

The factory of the Harry W. Clark Leather Company, Woburn, Mass., was destroyed by fire, February 15, with a loss of $90,000.

Philadelphia

PHILADELPHIA, PA., February 15, 1915.

A plant will be equipped at 4507 Chartres street, New Orleans, La., by the Philadelphia Quartz Company, 121 South Third street, Philadelphia, Pa. The equipment will cost about $3500.

The Phoenix Mills property Cooperstown, N. Y., consisting of a knitting mill, shops and storehouses, has been purchased by Lester I. Dingee, 56 North Delaware street, Philadelphia, Pa., who has completed plans for refitting and operating it.

W. E. S. Dyer, architect, Land Title Building, Philadelphia, has drawn plans for a one-story brick and concrete power plant, 30 x 60 ft., for the Estate of Daniel Lee, Glen Riddle, Pa. Construction bids are about due.

The Merchants' Ice Company, Harrisburg, Pa., is having plans drawn for a one-story brick ice plant of 75 tons capacity. C. H. Kain, Arcade Building, Harrisburg, is the architect.

The Hipple Planing Mill Company, Lock Haven, Pa., has taken over the property and business of the Hipple Estate, manufacturer of interior mill work for buildings.

Rothwell & Co., Martinsburg, W. Va., will establish a cold storage plant at Staunton, Va.

F. C. Stover, Strasburg, Va., is reported to have plans for the establishment of an ice factory.

J. F. Golding, chief engineer of the University of Virginia, Charlottesville, Va., is asking for prices on armature lathes.

The J. D. Blackard Stave & Cooperage Company, Stuart, Va., will install power and wood-working machinery for the manufacture of barrels, boxes, etc.

Cincinnati

CINCINNATI, OHIO, February 15, 1915.

Hardware merchants from all over the State are in attendance at the annual convention of the Ohio Hardware Association now in session in Cincinnati. With few exceptions these merchants report that business conditions are shaping themselves in the direction of improvement. This is especially true in the rural districts. One encouraging feature that is bound to react favorably on many manufacturers is that hardware stocks are smaller than they have been for years, so that when the merchants commence buying purchases will necessarily be heavier than usual.

The local machine tool situation is unchanged, with the lathe, milling machine and planer manufacturers very busy. However, the shaper and radial business continues slow. Machinery dealers report a slack demand from domestic sources, although several tools have been sold the automobile builders the past few weeks. The railroads are still very slow in placing orders. There appears to be a better demand for power plant equipment; but mostly for installation in public buildings.

Anton Rieg, architect, 2554 Vine street, Cincinnati, is preparing plans for a boiler house to be installed in a central heating plant for a church and school in Coryville, a suburb.

The Moerlein Brewing Company, Cincinnati, is taking estimates on power plant equipment, included in which is a large steam turbine engine.

The Dayton Supply Company, Dayton, Ohio, has acquired additional property adjoining its plant; but does not intend to make any additions at any near future date.

The press dispatches report that the Briscoe Motor Company, Jackson, Mich., has tentative plans under way for moving its plant to Dayton, Ohio. This rumor cannot be verified at this writing.

The Troy Wagon Works, Troy, Ohio, has confirmed the receipt of an export order for auto-truck trailers that will amount to $250,000.

The Middle West Supply Company, Columbus, Ohio, has secured a large printing contract from the post office department, and will soon let contract for a large plant to be located in or near Columbus. Harvey C. Garber is president.

The Burkett Mfg. Company, manufacturer of farm gas engines and other specialties, Columbus, Ohio, will build an addition to its plant.

The Oxford Pottery Company, Cambridge, Ohio, will increase the capacity of its plant by installing two additional kilns.

The New Process Hemp Company, Nappanee, Ind., will soon be in the market for a 150-hp. boiler to be installed in its plant.

Chicago

CHICAGO, ILL., February 15, 1915.

Reports from the machine tool manufacturers in surrounding territory show a much better scale of operations, attributable not only to foreign business but to an increased inquiry from domestic users. At Rockford a number of plants are working on full-turn schedules, and in two instances the past fortnight has necessitated overtime. A manufacturer of turret lathes, with whom substantial orders for machines occasioned by the war have been placed, is inquiring in neighboring towns for additional labor. In other lines, however, particularly auxiliary shop equipment, business continues very dull with little or no demand.

Machinery dealers report doing a satisfactory business in small orders, but nothing big has been placed in the last week. Manufacturers are, in some instances, seeking the cooperation of their dealers in meeting the early delivery demands from abroad. The replenishment of dealers' stocks, especially lathes, drills and milling machines, should they be depleted in the interest of foreign business at this time, might be seriously delayed.

Alex Bonthron, of Stockholm, Sweden, has an inquiry in the local market, for two 60-in. lathes and one 16-ft. boring mill. It is reported that the Warner Gear Company, Muncie, Ind., is buying a long line of gear cutters, this equipment to replace that now in use. Barber Coleman Company, Rockford, Ill., placed orders, last week, for a small line of tools. It is understood their inquiry included a screw machine on which long deliveries only were offered, indicating the present state of the market in special lines.

The Mohr Lino-Saw Company, Chicago, has been incorporated with a capital stock of $2500 to manufacture an automatic metal saw machine, etc. The incorporators are Paul W. Nachtrieb, Charles L. Mohr, 4020 West Jackson Boulevard, and Harry C. Kinne.

The Thomson Mfg. Company, Chicago, has been incorporated with a capital stock of $7500 by W. G. Thompson, H. L. Bert and H. T. Chace, 105 North Clark street. It will manufacture paper-feeding mechanism for printing presses.

The Johnson Variable Speed Gear Company, Chicago, has been incorporated with a capital stock of $25,000 to manufacture automobile equipment and specialties. Charles E. Sullivan, Clinton A. Johnson, 6921 Oakley avenue, and Ole C. Oleson are the incorporators.

The Steel Sales Corporation, Chicago, has been incorporated with a capital stock of $25,000 by A. D. Dorman, D. R. Hoffman, J. A. Roesch, F. W. Walters and B. E. McDonald to manufacture iron and other metals, etc.

The Rollins Steam Specialty & Valve Company, 17 West Kinzie street, Chicago, has changed its name to the Rollins Supply Company.

The Lincoln Sand & Gravel Company, Lincoln, Ill., expects to double the output of its plant in 1915 by adding new equipment.

The board of governors of the Loyal Order of Moose have voted to expend $350,000 for the construction of a machine shop, foundry and printing plant at Mooseheart, Ill. Plans for the building will be received in May.

The plant of the Stanley Tack Company, Belleville, Ill., which was recenty destroyed by fire, is being rebuilt.

The Cobden Light & Power Company, Cobden, Ill., has been incorporated with a capital stock of $15,000 by I. H., R. H. and R. L. Lawrence, and will equip an electric light and power plant.

The Hoyleton Electric Light Company, Hoyleton, Ill., has been incorporated with a capital stock of $15,000 by K. A., and C. A. Steinhauser and H. W. Rixman and will equip a plant at once.

The Brimfield Ice Company, Brimfield, Ill., has been incorporated with a capital stock of $12,500 by Con E. Kelly, Charles L. Dungan and Horace O. Cady.

The Perfect Stove & Mfg. Company, Belleville, Ill., has increased its capital stock from $10,000 to $25,000 and will increase its plant capacity.

The Defender Automatic Regulator Company, St. Louis, Mo., has been organized with a capital stock of $5000 to manufacture steam engines and power plant appliances. The incorporators are Elizabeth F. Kemp, William Kemp and A. M. Shelby.

The Crowley Iron & Machine Shops, Crowley, La., have been taken over by S. D. Wilder and the Freeland Brothers. The name of the new company will be the American Machine & Automobile Company.

The National Steel Post Company, Cedar Rapids, Iowa, has been incorporated with a capital stock of $250,000 to manufacture steel fence posts, steel farm gates and corn driers.

The Ft. Madison First Association, Ft. Madison, Iowa, has begun the erection of a factory for the Lawson Ice Machinery Company, Ft. Madison, Iowa.

Milwaukee

MILWAUKEE, WIS., February 15, 1915.

A few small orders for machine tools have come to Milwaukee builders the past week; but the situation is devoid of feature, sales being principally in single machines. With the approach of spring, prospects are more encouraging; but manufacturers say they must see actual evidence before they will put much stock in prospects. Although machine tool business, excepting for export shipments shows little appreciable improvement, the foundry business throughout the State and in Milwaukee is showing renewed life because of a more active demand from many sources, notably farm implement, automobile and dairying interests. Motor truck builders are in the market for crucible castings, because of extensive foreign orders. Gray iron foundries are doing a big business in gas engine cylinders. Malleable casting demand is improved.

The Four Wheel Drive Automobile Company, Clintonville, Wis., motor trucks and tractors, has been awarded a contract for approximately 130 four-wheel drive army cars, presumably on export account. This order, in addition to its regular domestic trade, has obliged it to place with the Prime Steel Company, Milwaukee, one of the largest orders for crucible steel castings it has ever booked.

The plant and property of the bankrupt United Refrigerator & Ice Machine Company, Kenosha, Wis., will be sold at public auction on March 15. The assets are valued at $200,000 in a conservative appraisal.

The report that the Koehring Machine Company, Milwaukee, Wis., manufacturer of concrete mixers, is planning an addition to its plant and that the recent increase to its capital was for this purpose, is untrue.

The C. Reiss Coal Company, Sheboygan, Wis., has awarded the contract for rebuilding its up-river coal docks at Manitowoc, Wis., which were badly damaged by a windstorm, to Mead, Morrison & Co., Boston, Mass. The work includes a new coal-handling bridge with a capacity of 3000 tons in 10 hours, and a complete electric plant for the operation of the dock.

The Prentiss-Weaver Mfg. Company, Grand Rapids, Wis., has been organized with $20,000 capital stock to manufacture a line of patented metal specialties. T. A. Taylor, D. B. Philleo and G. O. Babcock, Grand Rapids, are the incorporators. A plant will be equipped at once.

F. W. Ackerman and Henry Rolfs, West Bend, Wis., have organized a partnership under the style of the West Bend Plating & Mfg. Company.

The proposed plant of the Medford Light & Heating Company, Medford, Wis., will be of 300 kw. capacity.

Eben Burroughs, Racine, Wis., who has been manufacturing detachable rowboat and canoe motors on a small scale in the former Speere implement factory, has incorporated the business as the Burroughs Rowboat Motor Company, with a capital stock of $150,000, and has leased the former Holbrook-Armstrong Iron Company plant, Sixteenth street and Junction avenue. The incorporators of the new business are Eben Burroughs, John Armstrong and Arthur Bueher. Nearly all of the equipment has been provided.

The Allis-Chalmers Mfg. Company, Milwaukee, has awarded the general contract for the erection of its new transformer shop at the West Allis main works to Klug & Smith, consulting engineers, Mack Block, Milwaukee, who are buying material. It will be of brick and steel, one story, 60 x 140 ft.

The Electrical Shop, Racine, Wis., has been incorporated with $5000 capital stock by William Pratt, Koerner Brandels, and Fulton Thompson, attorney.

The Common Council, Janesville, Wis., has authorized a bond issue of $265,000 for the purchase of the plant of the Janesville Water Company on April 1, as authorized.

The Federal Rubber Mfg. Company, Cudahy, Milwaukee, has purchased additional acreage for the erection of a new group of buildings projected in 1914. A large manufacturing addition has just been started; and future work includes a garage and repair shop for automobiles owned by officials and employees; a main office; changing the present office to shop and tool room, and erecting a six-story factory. B. C. Dowse is president.

Carl J. Peterson, Grantsburg, Wis., is making an installation of welding and cutting equipment and additional tools in his machine shop and garage.

The Federal Malleable Company, West Allis, Milwaukee, has resumed operations in its foundry.

The Marathon Electric Mfg. Company, Wausau, Wis., established last summer, is unable to meet the demand for

its small motors, so that tentative plans have been made for extensions. Justin Lebovici is chief engineer.

The Davis Mfg. Company, Milwaukee, Wis., is erecting the first unit of its new plant, 200 ft. square, but will not be in the market for new machinery until May or June.

The machine shop of George J. Stehling & Son Company, 549 Tenth street, Milwaukee, will be enlarged at a cost of $15,000.

The Strauble Machine Company, Green Bay, Wis., is about to build a dock and install a new hoist and other equipment for its boat manufacturing and repair department.

Cleveland

CLEVELAND, OHIO, February 15, 1915.

Considerable inquiry is reported for lathes for making shrapnel cases, and in this territory dealers are taking a moderate volume of orders from scattered sources. The automobile industry continues to purchase additional machinery, part of it due to large war orders for trucks. The Cleveland Railway Company will shortly place orders for about 15 machine tools, mostly lathes, an inquiry for which came out some time ago. The Lake Shore Railroad Company has an inquiry out for a wheel-press and a car wheel lathe. This is the first inquiry from this source for many months. The demand for second-hand machinery is somewhat more active. The general situation in metal-working lines is slowly improving. In the foundry trade the demand for castings is broadening, and some shops that do not specialize on automobile work are now fairly busy.

The Warner & Swasey Company, Cleveland, has secured permission to increase its capital stock from $1,000,000 to $2,000,000. It is stated that the actual increase in the capital stock to be made this time will be only $250,000.

The Cleveland Steel Barrel Company, Cleveland, will enlarge its plant by the erection of a two-story brick office building.

Cleveland, Ohio, through its commissioner of purchases and supplies, will receive bids February 26 for a high-pressure duplex boiler feed pump and for transformers for the municipal light plant.

The Lake Erie Smelting & Refining Company, Cleveland, will erect a two-story brick, steel and concrete addition to its plant at 5302 Sweeney avenue, to be used for metallurgical and refining purposes.

The Cleveland Die, Tool & Engineering Company, Cleveland, will probably move its plant to Elyria, Ohio. According to present plans it will occupy a plant now used by the Elyria Belting & Machinery Company, which will erect a new factory on Elbe street.

The Blanchard Mfg. Company, Cleveland, has been incorporated with a capital stock of $10,000 by B. E. Blanchard, W. T. Stailer, A. C. Green, and others, to manufacture bed springs and spring beds.

The Fremont Stove Company, Fremont, Ohio, has started up its plant which has been shut down for a number of weeks.

The O. O. Poorman Company, Bremen, Ohio, will make some additions to its plant equipment.

The Ohio Corrugating Company, Warren, Ohio, has acquired a site in the southern part of that city on which it will shortly begin the erection of a plant.

The Heltzel Steel Form & Iron Company, Warren, Ohio, is making plans for extensions to its plant.

The Keasey Mfg. Company, Fostoria, Ohio, has been formed with a capital stock of $25,000 by C. D. Sullivan, Elizabeth B. Keasey, and others, to manufacture pulleys and machinery.

Detroit

DETROIT, MICH., February 15, 1915.

Business conditions in the machinery trade remain about the same as last week. Sales were fair, but small individually, those of metal-working tools predominating. Inquiry is coming out in fairly good volume, the automobile and accessory manufacturers contributing considerably thereto. The second-hand machinery market is dull and dealers are carrying heavy stocks. The demand for electrical machinery and power equipment is light, only the smaller units being in demand. The industrial situation continues to better itself although many manufacturers are not as well engaged as they were at the corresponding period last year. Labor, both skilled and unskilled, is plentiful. Building operations show no tendency to increase in volume.

The American Pattern Works, Detroit, has increased its capital stock from $10,000 to $50,000 for the purpose of adding the manufacture of automobile starters to its present line of patterns and experimental machinery. Some equipment will be added.

The plant and business of the Detroit Bathtub & Brass Mfg. Company, 97 Baltimore street, Detroit, has been purchased at receiver's sale by Frank Brothers. It is stated that a syndicate will soon take over the business and operate it on a larger scale.

The Federal Mfg. Company, Detroit, has been incorporated with $5000 capital stock to manufacture automobile lamps and other accessories. The incorporators are A. M. McCreed, David W. Rinohl and Thomas S. Merrill.

The Detroit Flexotile Floor Company, Detroit, has been incorporated with $10,000 capital stock by George A. Erskine, John H. Collins and John J. Trevaskus, and others, to manufacture flexotile products.

The Sparta Mfg. Company, Sparta, Mich., has been incorporated with $100,000 capital stock by W. Ioor, Joseph Renihan and L. W. Taylor. It will manufacture vending machines; and has acquired a large factory.

The Colby-Hinckley Company, Benton Harbor, Mich., box manufacturer, has awarded contracts for the erection of a box factory.

The Continental Motor Car Company, Muskegon, Mich., will erect a machine shop, 70 x 110 ft.

Indianapolis

INDIANAPOLIS, IND., February 15, 1915.

The plants of the Indiana Brass Works and the Smith Machine Works, Frankfort, Ind., were destroyed by fire February 11, with a loss of $35,000.

The Howard Machine Company, Goshen, Ind., has been incorporated with $10,000 capital stock to manufacture special machines. The directors are Ira T. Howard, Guy W. Dausman and Ethan A. Dausman.

The Modern Way Furnace Company, Ft. Wayne, Ind., has been incorporated by Herman W. Sigrist, Arthur E. Rose and Ernest L. Wampler, to manufacture heating devices.

The Gillam Wire Wiping Machine Company, Kokomo, Ind., has been incorporated with $25,000 capital stock to manufacture wire wiping machines. William O., and A. A. Gillam and Benjamin Hauens are the incorporators.

The American Clay Company and the Vigo County Clay Company have been merged into the Vigo-American Clay Company, Terre Haute, Ind. The capital stock is $75,000, and J. L. Crawford, H. S. Preston and L. R. Whitney are the directors.

The B. F. Biggs Pump Company, Lafayette, Ind., has issued $30,000 of preferred stock.

The city clerk, Garrett, Ind., will receive bids until March 4 for a generator for the lighting plant.

The Benson Mfg. Company, Owensville, Ind., has been taken over by the Benson Self Adjusting Pitman Company, recently organized. A patented pitman rod for lawn mowers will be manufactured, and the company plans to build a plant. W. C. Benson is manager.

Fire destroyed the building used by the Clover Leaf Railway Company, Frankfort, Ind., as a brass foundry and tin shop.

The Central South

LOUISVILLE, KY., February 15, 1915.

Although machinery manufacturing concerns are operating on a somewhat better schedule than heretofore, they report that business is still unsatisfactory, and that prospects and orders are both scarce. An interesting phase of the situation is the heavy demand for repairs and parts for special equipment, which is keeping some of the manufacturers busy, indicating, they suggest, that many concerns have decided to keep their old equipment in use by means of repairs, rather than invest in entirely new machinery. The demand for steam power equipment is dull. Electrical equipment, especially small units, is moving somewhat better.

The American Box & Crate Company, Louisville, has let building contracts for its new factory, and is ready to purchase special and general machinery.

The Sampson Engineering Company, Snead Building, Louisville, manufacturer of automobile specialties, is planning to put $100,000 additional into its plant.

The Hazard Light & Power Company, Hazard, Ky., which has not been operating, has been reorganized and will put its plant into condition for use.

The Crump Milling Company, Bowling Green, Ky., whose flour mill was burned recently, has advised that it will rebuild at a cost of about $10,000.

Chicago

CHICAGO, ILL., February 15, 1915.

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Alex Bonthron, of Stockholm, Sweden, has an inquiry in the local market, for two 60-in. lathes and one 16-ft. boring mill. It is reported that the Warner Gear Company, Muncie, Ind., is buying a long line of gear cutters, this equipment to replace that now in use. Barber Coleman Company, Rockford, Ill., placed orders, last week, for a small line of tools. It is understood their inquiry included a screw machine on which long deliveries only were offered, indicating the present state of the market in special lines.

The Mohr Lino-Saw Company, Chicago, has been incorporated with a capital stock of $2500 to manufacture an automatic metal saw machine, etc. The incorporators are Paul W. Nachtrieb, Charles L. Mohr, 4020 West Jackson Boulevard, and Harry C. Kinne.

The Thomson Mfg. Company, Chicago, has been incorporated with a capital stock of $7500 by W. G. Thompson, H. L. Bert and H. T. Chace, 105 North Clark street. It will manufacture paper-feeding mechanism for printing presses.

The Johnson Variable Speed Gear Company, Chicago, has been incorporated with a capital stock of $25,000 to manufacture automobile equipment and specialties. Charles E. Sullivan, Clinton A. Johnson, 6921 Oakley avenue, and Ole C. Oleson are the incorporators.

The Steel Sales Corporation, Chicago, has been incorporated with a capital stock of $25,000 by A. D. Dorman, D. R. Hoffman, J. A. Roesch, F. W. Walters and B. E. McDonald to manufacture iron and other metals, etc.

The Rollins Steam Specialty & Valve Company, 17 West Kinzie street, Chicago, has changed its name to the Rollins Supply Company.

The Lincoln Sand & Gravel Company, Lincoln, Ill., expects to double the output of its plant in 1915 by adding new equipment.

The board of governors of the Loyal Order of Moose have voted to expend $350,000 for the construction of a machine shop, foundry and printing plant at Mooseheart, Ill. Plans for the building will be received in May.

The plant of the Stanley Tack Company, Belleville, Ill., which was recenty destroyed by fire, is being rebuilt.

The Cobden Light & Power Company, Cobden, Ill., has been incorporated with a capital stock of $15,000 by I. H., R. H. and R. L. Lawrence, and will equip an electric light and power plant.

The Hoyleton Electric Light Company, Hoyleton, Ill., has been incorporated with a capital stock of $15,000 by K. A., and C. A. Steinhauser and H. W. Rixman and will equip a plant at once.

The Brimfield Ice Company, Brimfield, Ill., has been incorporated with a capital stock of $12,500 by Con E. Kelly, Charles L. Dungan and Horace O. Cady.

The Perfect Stove & Mfg. Company, Belleville, Ill., has increased its capital stock from $10,000 to $25,000 and will increase its plant capacity.

The Defender Automatic Regulator Company, St. Louis, Mo., has been organized with a capital stock of $5000 to manufacture steam engines and power plant appliances. The incorporators are Elizabeth F. Kemp, William Kemp and A. M. Shelby.

The Crowley Iron & Machine Shops, Crowley, La., have been taken over by S. D. Wilder and the Freeland Brothers. The name of the new company will be the American Machine & Automobile Company.

The National Steel Post Company, Cedar Rapids, Iowa, has been incorporated with a capital stock of $250,000 to manufacture steel fence posts, steel farm gates and corn driers.

The Ft. Madison First Association, Ft. Madison, Iowa, has begun the erection of a factory for the Lawson Ice Machinery Company, Ft. Madison, Iowa.

Milwaukee

MILWAUKEE, WIS., February 15, 1915.

A few small orders for machine tools have come to Milwaukee builders the past week; but the situation is devoid of feature, sales being principally in single machines. With the approach of spring, prospects are more encouraging; but manufacturers say they must see actual evidence before they will put much stock in prospects. Although machine tool business, excepting for export shipments shows little appreciable improvement, the foundry business throughout the State and in Milwaukee is showing renewed life because of a more active demand from many sources, notably farm implement, automobile and dairying interests. Motor truck builders are in the market for crucible castings, because of extensive foreign orders. Gray iron foundries are doing a big business in gas engine cylinders. Malleable casting demand is improved.

The Four Wheel Drive Automobile Company, Clintonville, Wis., motor trucks and tractors, has been awarded a contract for approximately 130 four-wheel drive army cars, presumably on export account. This order, in addition to its regular domestic trade, has obliged it to place with the Prime Steel Company, Milwaukee, one of the largest orders for crucible steel castings it has ever booked.

The plant and property of the bankrupt United Refrigerator & Ice Machine Company, Kenosha, Wis., will be sold at public auction on March 15. The assets are valued at $200,000 in a conservative appraisal.

The report that the Koehring Machine Company, Milwaukee, Wis., manufacturer of concrete mixers, is planning an addition to its plant and that the recent increase to its capital was for this purpose, is untrue.

The C. Reiss Coal Company, Sheboygan, Wis., has awarded the contract for rebuilding its up-river coal docks at Manitowoc, Wis., which were badly damaged by a windstorm, to Mead, Morrison & Co., Boston, Mass. The work includes a new coal-handling bridge with a capacity of 3000 tons in 10 hours, and a complete electric plant for the operation of the dock.

The Prentiss-Weaver Mfg. Company, Grand Rapids, Wis., has been organized with $20,000 capital stock to manufacture a line of patented metal specialties. T. A. Taylor, D. B. Philleo and G. O. Babcock, Grand Rapids, are the incorporators. A plant will be equipped at once.

F. W. Ackerman and Henry Rolfs, West Bend, Wis., have organized a partnership under the style of the West Bend Plating & Mfg. Company.

The proposed plant of the Medford Light & Heating Company, Medford, Wis., will be of 300 kw. capacity.

Eben Burroughs, Racine, Wis., who has been manufacturing detachable rowboat and canoe motors on a small scale in the former Speere implement factory, has incorporated the business as the Burroughs Rowboat Motor Company, with a capital stock of $150,000, and has leased the former Holbrook-Armstrong Iron Company plant, Sixteenth street and Junction avenue. The incorporators of the new business are Eben Burroughs, John Armstrong and Arthur Bueher. Nearly all of the equipment has been provided.

The Allis-Chalmers Mfg. Company, Milwaukee, has awarded the general contract for the erection of its new transformer shop at the West Allis main works to Klug & Smith, consulting engineers, Mack Block, Milwaukee, who are buying material. It will be of brick and steel, one story, 60 x 140 ft.

The Electrical Shop, Racine, Wis., has been incorporated with $5000 capital stock by William Pratt, Koerner Brandels, and Fulton Thompson, attorney.

The Common Council, Janesville, Wis., has authorized a bond issue of $265,000 for the purchase of the plant of the Janesville Water Company on April 1, as authorized.

The Federal Rubber Mfg. Company, Cudahy, Milwaukee, has purchased additional acreage for the erection of a new group of buildings projected in 1914. A large manufacturing addition has just been started; and future work includes a garage and repair shop for automobiles owned by officials and employees; a main office; changing the present office to shop and tool room, and erecting a six-story factory. B. C. Dowse is president.

Carl J. Peterson, Grantsburg, Wis., is making an installation of welding and cutting equipment and additional tools in his machine shop and garage.

The Federal Malleable Company, West Allis, Milwaukee, has resumed operations in its foundry.

The Marathon Electric Mfg. Company, Wausau, Wis., established last summer, is unable to meet the demand for

its small motors, so that tentative plans have been made for extensions. Justin Lebovici is chief engineer.

The Davis Mfg. Company, Milwaukee, Wis., is erecting the first unit of its new plant, 200 ft. square, but will not be in the market for new machinery until May or June.

The machine shop of George J. Stehling & Son Company, 549 Tenth street, Milwaukee, will be enlarged at a cost of $15,000.

The Strauble Machine Company, Green Bay, Wis., is about to build a dock and install a new hoist and other equipment for its boat manufacturing and repair department.

Cleveland

CLEVELAND, OHIO, February 15, 1915.

Considerable inquiry is reported for lathes for making shrapnel cases, and in this territory dealers are taking a moderate volume of orders from scattered sources. The automobile industry continues to purchase additional machinery, part of it due to large war orders for trucks. The Cleveland Railway Company will shortly place orders for about 15 machine tools, mostly lathes, an inquiry for which came out some time ago. The Lake Shore Railroad Company has an inquiry out for a wheel-press and a car wheel lathe. This is the first inquiry from this source for many months. The demand for second-hand machinery is somewhat more active. The general situation in metal-working lines is slowly improving. In the foundry trade the demand for castings is broadening, and some shops that do not specialize on automobile work are now fairly busy.

The Warner & Swasey Company, Cleveland, has secured permission to increase its capital stock from $1,000,000 to $2,000,000. It is stated that the actual increase in the capital stock to be made this time will be only $250,000.

The Cleveland Steel Barrel Company, Cleveland, will enlarge its plant by the erection of a two-story brick office building.

Cleveland, Ohio, through its commissioner of purchases and supplies, will receive bids February 26 for a high-pressure duplex boiler feed pump and for transformers for the municipal light plant.

The Lake Erie Smelting & Refining Company, Cleveland, will erect a two-story brick, steel and concrete addition to its plant at 5302 Sweeney avenue, to be used for metallurgical and refining purposes.

The Cleveland Die, Tool & Engineering Company, Cleveland, will probably move its plant to Elyria, Ohio. According to present plans it will occupy a plant now used by the Elyria Belting & Machinery Company, which will erect a new factory on Elbe street.

The Blanchard Mfg. Company, Cleveland, has been incorporated with a capital stock of $10,000 by B. E. Blanchard, W. T. Stailer, A. C. Green, and others, to manufacture bed springs and spring beds.

The Fremont Stove Company, Fremont, Ohio, has started up its plant which has been shut down for a number of weeks.

The O. O. Poorman Company, Bremen, Ohio, will make some additions to its plant equipment.

The Ohio Corrugating Company, Warren, Ohio, has acquired a site in the southern part of that city on which it will shortly begin the erection of a plant.

The Heltzel Steel Form & Iron Company, Warren, Ohio, is making plans for extensions to its plant.

The Keasey Mfg. Company, Fostoria, Ohio, has been formed with a capital stock of $25,000 by C. D. Sullivan, Elizabeth B. Keasey, and others, to manufacture pulleys and machinery.

Detroit

DETROIT, MICH., February 15, 1915.

Business conditions in the machinery trade remain about the same as last week. Sales were fair, but small individually, those of metal-working tools predominating. Inquiry is coming out in fairly good volume, the automobile and accessory manufacturers contributing considerably thereto. The second-hand machinery market is dull and dealers are carrying heavy stocks. The demand for electrical machinery and power equipment is light, only the smaller units being in demand. The industrial situation continues to better itself although many manufacturers are not as well engaged as they were at the corresponding period last year. Labor, both skilled and unskilled, is plentiful. Building operations show no tendency to increase in volume.

The American Pattern Works, Detroit, has increased its capital stock from $10,000 to $50,000 for the purpose of adding the manufacture of automobile starters to its present line of patterns and experimental machinery. Some equipment will be added.

The plant and business of the Detroit Bathtub & Brass Mfg. Company, 97 Baltimore street, Detroit, has been purchased at receiver's sale by Frank Brothers. It is stated that a syndicate will soon take over the business and operate it on a larger scale.

The Federal Mfg. Company, Detroit, has been incorporated with $5000 capital stock to manufacture automobile lamps and other accessories. The incorporators are A. M. McCreed, David W. Rinohl and Thomas S. Merrill.

The Detroit Flexotile Floor Company, Detroit, has been incorporated with $10,000 capital stock by George A. Erskine, John H. Collins and John J. Trevaskus, and others, to manufacture flexotile products.

The Sparta Mfg. Company, Sparta, Mich., has been incorporated with $100,000 capital stock by W. Ioor, Joseph Renihan and L. W. Taylor. It will manufacture vending machines; and has acquired a large factory.

The Colby-Hinckley Company, Benton Harbor, Mich., box manufacturer, has awarded contracts for the erection of a box factory.

The Continental Motor Car Company, Muskegon, Mich., will erect a machine shop, 70 x 110 ft.

Indianapolis

INDIANAPOLIS, IND., February 15, 1915.

The plants of the Indiana Brass Works and the Smith Machine Works, Frankfort, Ind., were destroyed by fire February 11, with a loss of $35,000.

The Howard Machine Company, Goshen, Ind., has been incorporated with $10,000 capital stock to manufacture special machines. The directors are Ira T. Howard, Guy W. Dausman and Ethan A. Dausman.

The Modern Way Furnace Company, Ft. Wayne, Ind., has been incorporated by Herman W. Sigrist, Arthur E. Rose and Ernest L. Wampler, to manufacture heating devices.

The Gillam Wire Wiping Machine Company, Kokomo, Ind., has been incorporated with $25,000 capital stock to manufacture wire wiping machines. William O., and A. A. Gillam and Benjamin Hauens are the incorporators.

The American Clay Company and the Vigo County Clay Company have been merged into the Vigo-American Clay Company, Terre Haute, Ind. The capital stock is $75,000, and J. L. Crawford, H. S. Preston and L. R. Whitney are the directors.

The B. F. Biggs Pump Company, Lafayette, Ind., has issued $30,000 of preferred stock.

The city clerk, Garrett, Ind., will receive bids until March 4 for a generator for the lighting plant.

The Benson Mfg. Company, Owensville, Ind., has been taken over by the Benson Self Adjusting Pitman Company, recently organized. A patented pitman rod for lawn mowers will be manufactured, and the company plans to build a plant. W. C. Benson is manager.

Fire destroyed the building used by the Clover Leaf Railway Company, Frankfort, Ind., as a brass foundry and tin shop.

The Central South

LOUISVILLE, KY., February 15, 1915.

Although machinery manufacturing concerns are operating on a somewhat better schedule than heretofore, they report that business is still unsatisfactory, and that prospects and orders are both scarce. An interesting phase of the situation is the heavy demand for repairs and parts for special equipment, which is keeping some of the manufacturers busy, indicating, they suggest, that many concerns have decided to keep their old equipment in use by means of repairs, rather than invest in entirely new machinery. The demand for steam power equipment is dull. Electrical equipment, especially small units, is moving somewhat better.

The American Box & Crate Company, Louisville, has let building contracts for its new factory, and is ready to purchase special and general machinery.

The Sampson Engineering Company, Snead Building, Louisville, manufacturer of automobile specialties, is planning to put $100,000 additional into its plant.

The Hazard Light & Power Company, Hazard, Ky., which has not been operating, has been reorganized and will put its plant into condition for use.

The Crump Milling Company, Bowling Green, Ky., whose flour mill was burned recently, has advised that it will rebuild at a cost of about $10,000.

Shelby Gish, Central City, Ky., is reported to have plans for the establishment of an ice factory with a capacity of 25 tons a day.

H. E. Hay, Corbin, Ky., purchased the electric light franchise offered by the town of Irvine, Ky., and will install a plant to cost about $5000.

Corbin, Ky., has sold $5000 of bonds for improving the municipal electric light plant. The mayor is in charge.

The increase in the common and preferred stock of the Weyman-Bruton Company of $2,000,000 each, is understood to be the first step toward the proposed erection of a large snuff factory at Paducah, Ky.

The Stanford Water, Light & Ice Company, Stanford, Ky., is reported to have plans for extensive improvements in its ice plant.

The Elkton Machine Company, Elkton, Ky., has taken over the plant and business of the Elkton Machine Works. N. P. Blankenship, C. E. Wright and M. H. Wakefield compose the company.

T. L. Elder, Paducah, Ky., is interested in the establishment of a wood-bending plant.

Briggs Brothers, Franklin, Ky., have leased a building at 433 Broadway, Nashville, Tenn., and will equip it for paint manufacture.

The Warren County Marble & Granite Works, Tullahoma, Tenn., will purchase electric motors, compressed air equipment, etc., for a plant which it is establishing. Lewis C. Turpin is manager.

The Harlan-Morris Mfg. Company, Corinth, Miss., will establish a cooperage factory at Jackson, Tenn.

H. M. Weller, Sanford, N. C., is establishing a furniture factory at Morristown, Tenn. A building has been leased, and equipment will be installed for the manufacture of tables.

Sells & Miller, Johnson City, Tenn., will install a sawmill.

The H. P. Wyman Lumber Company, Bristol, Tenn., will establish a large sawmill at Johnson's Mill, Tenn., where it has purchased a large acreage of timber. A railroad will be built into the property.

The Atkins Lumber Company, Atkins, Tenn., is establishing a sawmill with a capacity of 75,000 ft. a day.

The Crystal Ice Company, Salem, Va., plans to enlarge its cold storage department. C. A. Gittens is manager.

The Mound City Automobile Company, Moundsville, W. Va., is preparing to build a garage at Seventh street and Tomlinson avenue, and will need machine tools for a repair shop.

Birmingham

BIRMINGHAM, ALA., February 15, 1915.

The inquiry from farming sections continues to be good without any special business done. The general outlook is for betterment all around.

It is understood that the United States Cast Iron Pipe Company, Bessemer, Ala., will expend $50,000 on improvements at the plant.

Girard, Ala., proposes to engage in the manufacture of concrete sewer pipe.

M. D. Moore, Marion, Ala., will establish a grist mill.

J. T. Pope, Dublin, Ga., is increasing the capacity of his flour mill from 75 to 100 bbl. daily.

The Waynesboro Milling Company, Waynesboro, Ga., has been organized with a capital stock of $15,000 to establish a flouring mill with a daily capacity of 50 bbl. John L. Boyd, R. G. Neely, and others, are interested.

The City Ice Company, Thomasville, Ga., has been incorporated with a capital stock of $25,000 with privilege to increase to $100,000, by W. E. Beverley, W. J. Upchurch, and others.

The Myers Paint Company, Waycross, Ga., has been incorporated with a capital stock of $5000 and privilege to increase to $50,000 by J. T. Vaughan, J. T. Myers, and others, to manufacture paints, etc.

The Green Marble Company, Holly Springs, Ga., has been incorporated by F. L. De Lay, W. L. Mullins, and others, with a capital stock of $50,000 and privilege to increase to $250,000, to quarry stone and marble.

Pablo Beach, Fla., has voted bonds for a municipal electric lighting plant.

The Syleecau Mfg. Company, Rock Hill, S. C., will begin the erection of a brick factory, 70 x 150 ft., to cost about $15,000. No new machinery is planned for at present.

An item in *The Iron Age*, issue of February 4, regarding the incorporation of the Mangis Company, Atlanta, Ga., was incorrect. The name should have been given as the Magnus Company, Atlanta, Ga. It will manufacture brass and bronze castings and bearings.

St. Louis

ST. LOUIS, MO., February 15, 1915.

The machine tool trade has moved steadily forward the past week. There are no large lists appearing; but new business is of a kind which indicates a conservative expansion in a number of industries. New enterprises continue to increase, judging from the incorporation lists. Money is easy in St. Louis trade territory and the disposition to let more and more of it go into permanent investment is increasing. Merchants appearing in this primary market, in all lines of trade and from various sections, report the situation much better and likely to continue so. Collections are reported good, banks more inclined to make loans for longer terms and in many ways the outlook is more promising.

The Superior Folding Box Company, St. Louis, has acquired new quarters into which it will move and increase its manufacturing equipment.

The Panama Rubber & Equipment Company, St. Louis, has been incorporated with a capital stock of $18,000 by Garfield Giese, Carl G. Schwarz and F. F. Hull to manufacture rubber goods.

The Moerschell Electric Supply Company, St. Louis, has been incorporated with a capital stock of $15,000 by Victor R. Appel, William E. Moerschell and Charles J. Kron to manufacture automobile accessories, electric machines, etc.

The Schlueter Mfg. Company, St. Louis, has been incorporated with a capital stock of $175,000 by Julius A., Walter H., Albert J. and Herbert C. Schlueter to do a general metal-ware manufacturing business.

The Allen Novelty Company, St. Louis, has been incorporated with a capital stock of $12,000 by J. B. Myers, E. B. Roth, W. and D. Christman to manufacture scissors sharpeners, etc.

The Eberson-Lindsley Paint Company, St. Louis, has been incorporated with a capital stock of $50,000 by George A. Meyer, J. M. Lindsley, H. P. Fritsch and Charles A. Niemeyer to manufacture paints, etc.

The Chillicothe Ice & Fuel Company, Chillicothe, Mo., has increased its capital stock from $35,000 to $45,000.

The Lechtman Printing Company, Kansas City, Mo., has been incorporated with a capital stock of $200,000 by Cusil, Nathan and E. K. Lechtman.

The Airplex Inner Tire Company, 3147 Locust street, St. Louis, will move its plant to Springfield, Mo., and will increase its equipment.

The Flannagan-Zeller Brick & Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $30,000 by J. A. Flannagan, W. J. Zeller and A. W. Miller.

At Cape Girardeau, Mo., the Little River Drainage District, of which J. H. Himmelberger is president, will do about 6,000,000 cu. yd. of excavation.

C. L. Marratt, East Prairie, Mo., has plans for the installation of an electric light and power plant.

Julian J. Ross, Hannibal, Mo., has plans for the installation at Hume, Mo., of an electric light and power plant, and an ice plant of about 12 tons capacity.

A power plant of special design is to be installed in St. Joseph's Hospital, Kansas City, Mo. Henrici, Kent & Lowry are the engineers.

An electric light and waterworks plant is to be installed at Knobnoster, Mo., by the Standard Engineering Company, Republic Building, Kansas City, Mo. John J. Freundlich is in charge. Crude oil engines, generators, etc., are wanted.

Pleasant Hill, Mo., will equip an electric light and power plant. The mayor is in charge.

An ice plant of about 17½ tons daily capacity will be installed by John C. Henry, Blackwater, Mo., to replace one destroyed by fire.

The Higginsville Milling Company, Higginsville, Mo., will increase its elevator capacity, installing equipment and building a concrete structure of about 30,000 bu. capacity.

An electric light plant will be installed at Fairport, Mo., in the near future.

West Plains, Mo., will install a motor-driven triplex pump of about 650,000 gal. capacity and a 40-hp. motor for air lift system. V. V. Sears is commissioner.

The engine plant of the Bates Mining Company, Rich Hill, Mo., has been burned. It will be replaced at once.

The Arkansas Light & Power Company, Malvern, Ark., has plans for the installation of a system at Stephens, Ark., with a generating station at Camden, Ark.

The waterworks, sewer construction and equipment work at Heber Springs, Ark., will cost about $100,000. W. F. Cook, engineer, Little Rock, Ark., is in charge.

The Luxora Water & Light Company, Luxora, Ark., will expend about $10,000 to increase its waterworks plant capacity.

John D. Bomford has acquired the light plant of the Bennington Light, Ice & Power Company, Bennington, Okla. He will improve the equipment and install an ice plant of undetermined capacity.

W. K. Bishop, Jet, Okla., plans the equipment of a flour mill of about 50 bbl. capacity.

At receiver's sale, the plant of the Ft. Smith Steel & Iron Company, Arkoma, Okla., was sold for $8378.57 to L. Feenburg, Ft. Smith, Ark.

The O. K. Reversing Gas & Engine Company, Tulsa, Okla., has been incorporated with a capital stock of $250,000 by J. W. Sloan, C. A., and G. T. Braden and J. R. Kennan.

The High Pipe Line Company, Sapulpa, Okla, has been incorporated with a capital stock of $100,000 by G. E. and B. M. Potter and S. C. Potter and will install pumps, etc.

The Oil Producers Company, Tulsa, Okla., has been incorporated with a capital stock of $1,000,000 by E. P. Perry, R. F. Poe and M. Dickerson and will equip a pipe line and a refinery. Pumping plant machinery is wanted.

The Imperial Ice Company, Cleveland, Okla., has bought the Shepard & Chain Ice Company's plant at Cleveland and will increase its capacity. E. B. Lawson, Nowata, Okla., is president; and Charles Fulton, Cleveland, Okla., is manager.

A service station and repair plant will be equipped at once at Tulsa, Okla., by the Ford Motor Company, Detroit, Mich.

The waterworks plant for Red Rock, Okla., which will cost about $22,000, will be designed by the Benham Engineering Company, Oklahoma City, Okla.

N. C. McGinnis & Co., Exchange Building, Memphis, Tenn., will do the excavation work on the Big Black Drainage District No. 1, Ackerman, Miss., and are reported in the market for equipment.

Jackson, Miss., has voted bonds for $160,000 for an electric light and power plant. M. L. Culley, city engineer, is in charge.

J. N. Brownlee, Shubuta, Miss., will equip a foundry and machine shop.

M. R. Mitchell, Jackson, Miss., will receive bids for refrigerating machinery.

The Crystal Ice Company, Tupelo, Miss., has been incorporated with a capital stock of $30,000 by R. W. Reed, B. A. Rogers, and others, and will install equipment at once.

Thompson & Dupont, New Orleans, La., will install sawmills on a large tract of timber land near Ellisville, Miss.

The H. D. Foote Lumber Company, Hattiesburg, Miss., has been incorporated with a capital stock of $17,500 by H. D. and J. R. Foote, Hattiesburg, and A. W. Seeley, Saginaw, Mich. It will equip a mill.

The Hattiesburg Wood Reduction Company, Hattiesburg, Miss., of which T. S. Jackson is president, will install equipment, increasing its capacity by about 50 cords daily.

Biloxi, Miss., has voted $12,000 for the extension of its waterworks plant equipment.

Belzoni, Miss., will install a waterworks pump of about 500,000 gal. daily capacity.

The Citizens Co-operative Automobile Transportation Company, Canal Bank Building, New Orleans, La., has been incorporated with a capital of $125,000 by J. Gonzales, W. R. Grace, M. D. Connors, and others. It will install its own repair and garage equipment.

An ice plant of about 12 tons daily capacity will be equipped at St. Martinville, La., by John Meal, New Orleans, La.

A public lighting plant at New Orleans, La., is planned by George T. Bishop, president of the Cleveland Traction Company, Cleveland, Ohio.

Texas

AUSTIN, TEXAS, February 11, 1915.

In southern Texas farmers are planting corn. Business conditions generally continue to show an improvement. The machinery and tool trade is beginning to show evidence of spring activity.

The Southwestern Traction Company, Dallas, will soon begin the construction of an interurban electric railway to run between that city and Cleburne. Plans involve building a power plant. E. P. Turner is president.

The Sunrise Rock & Gravel Company, Houston, has been organized with a capital stock of $10,000 to operate quarries and gravel beds. J. E. Sieber is one of the principal stockholders.

E. E. Fertsch and E. W. Hoppe recently purchased an ice plant at Hallettsville, and will install machinery and make other improvements.

The Somerville Ice Company, Somerville, will make improvements to the local electric light plant.

The Yoakum Power, Light & Water Company, Yoakum, will install a street lighting system.

The Panhandle Grain & Elevator Company, Amarillo, has been organized with a capital stock of $50,000 by G. W. Crowerell and others.

The Texas Supply Company, Beaumont, has been organized with a capital stock of $20,000 by M. L. Hurvitz and others.

James Cunningham and C. B. Wilson, Nogales, Ariz., will install a pumping plant and gasoline engine at their mining claims in the Santa Rita Mountains.

The Pacific Northwest

SEATTLE, WASH., February 9, 1915.

The lumber trade is already beginning to feel the effects of the European demand. Through local representatives the British Government is asking for bids on 500,000,000 ft. to be used in constructing 100,000 two-room houses. It is understood the inquiry comes originally through the Chamber of Deputies of France.

Several of the large shops at coast points are now well occupied with marine repair work, and also more activity is noticed among the interior shops. The implement trade is gaining steadily; and a revival in the mining and smelting industry is bringing more business in several lines. Accordingly, a little more inquiry for tools and shop equipment is reported, although the business is mostly of a small nature. Canning machinery continues quite active.

A number of orders, pending since last fall, have materialized for shingle-mill machinery. While small, machinery dealers believe they indicate a fair amount of business for spring delivery. A large amount of road work will be done in the State of Washington, and already inquiries for such machinery are coming in.

C. W. Carter, of the Berger & Carter Company, San Francisco, manufacturer of canning machinery, has arranged for the establishment of a branch at Seattle.

The Nelson Iron Works, Marshfield, Ore., has changed its name to the Coos Bay Iron Works, Fred Nelson retiring from the company. J. S. Lyons is manager, and the company is getting out a new line of gas engines.

The Morrison mill has been purchased by McCarthy, Allen & Marshall, Ferndale, Wash., and will be overhauled and new machinery installed. New shingle-making machinery will be added.

C. W. Mower, Spokane, Wash., is planning the erection of a factory at Los Angeles, Cal., for the construction of portable garage and beach houses, to cost $40,000.

Announcement has been made by Harry H. Knox, president and general manager of the Alaska Electric Consolidated Company, Cordova, Alaska, that work on the plant which the company proposes building, will start early in the spring. The funds to cover cost have been secured, and plans are completed.

Barview, Ore., will install a light and power plant. J. R. Wheeler, electrical engineer, Barview, will have charge. It is planned to complete the installation before summer.

It is reported that the Carlyle-Pennel Lumber Company Portland, Ore., will build a large sawmill near Copallis, Wash.

C. D. Kennedy, Portand, Ore., agent for the American-Hawaiian Steamship Company, states that the company contemplates the construction of three large lumber vessels.

The Western Cooperage Company, Portland, Ore., is now receiving bids for the electrical installation in its plant under erection at St. John, Ore. Plans were prepared by R. G. Little, of the West Coast Engineering Company, Portland.

The Western Cereal Company, Spokane, Wash., will dismantle its factory at 1019 Boone avenue, and will erect a plant for the manufacture of cereals by new processes. L. E. Ragsdale is president.

Preliminary work has begun on the clam cannery to be built by the Aberdeen Brewery Company, Aberdeen, at a cost of $30,000. Machinery has not yet been purchased.

The plant of the Dupont Powder Company, Dupont, Wash., was damaged by a recent explosion. The black-powder factory, which was completely destroyed, will be rebuilt.

The Northwest Electric & Waterworks, Montesano, Wash., has entered into a contract with the Sunset Shingle Company to construct a powerhouse at the plant of the shingle mill to utilize waste material. The present power plant at Sylvia Lake will be enlarged and used as an auxiliary plant.

The National Wrapping Machine Company, Portland, Ore., has filed articles of incorporation, with a capital stock of $300,000 by Arthur D. Galyer, William D. Bennett and Robert

Tucker, and will construct a factory for the manufacture of its patented machine.

Lundberg & Mahon, architects, Provident Building, Tacoma, Wash., will receive bids at once for a refrigeration and ice-making plant to cost $3500.

The Dalbey-Lockhart Steel Company, Great Falls, Mont., has been incorporated with a capital stock of $25,000 to manufacture fabricating steel to be used in concrete construction. The incorporators are E. H. Dalbey, C. B. Lockhart and J. H. Bondy.

Eastern Canada

TORONTO, ONT., February 15, 1915.

The agitation which some of the newspapers have been carrying on in favor of the prohibition of the export of nickel has culminated in the appointment of a commission by the Ontario Government to probe the matter, and the introduction of a bill in the Federal House to regulate the exportation of the metal. The bill is not likely to reach an advanced stage, as Premier Borden announced in the House of Commons a few days ago that the British Government was quite satisfied with the precautions the Canadian Government has taken to prevent nickel reaching Germany. Of the 50,580,536 lb. of nickel exported from Canada last year 43,989,648 lb. went to the United States, 6,805,093 lb. to Great Britain and 108,136 lb. to Germany. The commission appointed by the Ontario Government will endeavor to find a way for the refining of nickel in the Province.

Estimates tabled in the House of Commons, Ottawa, provide for an expenditure of $190,329,352. The chief items to be expended on public works, railways and canals are: Intercolonial railroad, $8,128,000; Prince Edward Island Railroad, $1,938,000; Hudson Bay Railroad, $5,500,000; National Transcontinental Railroad, $5,000,000; Quebec Bridge, $3,500,000; Welland Canal, $5,500,000; to continue public works at Esquimalt, Halifax, Port Arthur, Quebec, St. John, N. B., Toronto, Vancouver, Victoria, etc., $9,459,000.

As a result of the improved condition of the iron and steel industry in Canada the Nova Scotia Steel & Coal Company, Ltd., has restored the 25 per cent. reduction made in July in the wages of its employees at the steel plant at New Glasgow.

A return laid upon the table in the House of Commons at Ottawa on February 11 showed that the Canadian Government has so far expended $26,221,000 on account of the war.

The Ingersoll Machine Company, Ingersoll, Ont., is to put in new machinery for the manufacture of shrapnel shells.

A plant to manufacture ammunition for the British Government is contemplated by the Massey-Harris Company, Ltd., Toronto. Thomas Findlay is general manager.

The Montreal Locomotive Company, Montreal, having obtained an order for shrapnel shells, is buying hydraulic presses and other equipment.

The Collingwood Shipbuilding Company, Collingwood, Ont., is to put in equipment for manufacturing shrapnel shells.

The Ogilvie Flour Company, Ft. William, Ont., is to erect a 750,000 bu. addition to its elevator.

The plant of the Barrie Foundry Company, Barrie, Ont., has been damaged by fire to the extent of $1300.

It is reported that James S. Gregory, St. John, N. B., has purchased the Hilyard mill property for $75,000, including shingle mills, docks, slips, etc.

The Canadian Vehicle Company, Peterborough, Ont., has purchased 50 ft. of land on which to erect an addition to its factory.

The McQuay Tanning Company, Owen Sound, will improve its boiler house and power plant, etc., at an estimated cost of $15,000.

The Phoenix Foundry Company, St. John, N. B., is to put in equipment for the manufacture of shrapnel shells.

The Alliance Lumber Company, Ltd., Hamilton, Ont., has been incorporated with capital of $40,000 to manufacture lumber, woodenware, etc. The provisional directors are R. J. Press, Matthew and Daniel Cole.

The Pulsetter Company, Ltd., Toronto, has obtained a charter to manufacture marine and general engineering supplies. The capital stock is $40,000. Rutherford Williamson, F. W. Hill and J. P. White are provisional directors.

The Aitken Milling Company, Ltd., Beeton, Ont., has been incorporated with a capital stock of $50,000 by James and M. L. Aitken.

Boyd-Brandon, Ltd., Toronto, has been incorporated to manufacture building material, with a capital of $100,000. Among the provisional directors are Robert and S. E. Boyd and W. B. Milliken.

The Canadian Brown Scientific Tube & Accessories, Ltd., Ottawa, has been incorporated with capital of $50,000 to manufacture automobiles, engines, etc. J. A. Brennan, W. J. Wallace and D. E. Winter are the incorporators.

J. A. D. McCurdy, Toronto, has formed the Curtiss Aeroplanes and Motors, Ltd., to manufacture aeroplanes. Mr. McCurdy has been in close touch with Glen Curtiss, Hammondsport, N. Y., and the engines used will be of the Curtiss model.

Newmarket, Ont., has authorized debentures to the amount of $15,000 for new power and lighting equipment. H. S. Cane is mayor.

Western Canada

WINNIPEG, MAN., February 11, 1915.

British Columbia mills announce that through the Canadian Pacific Railroad and Government Purchasing Agent the United Kingdom has placed an order for 3,000,000 ft. of railway ties and bridge timbers, the order to be filled in 30 days. Nine mills are handling the order.

The plant of the Westminster Wire & Nail Works, Lulu Island, B. C., has been purchased by G. W. Laidlaw, New Westminster, B. C., and improvements and extensions will be made to it. New machinery will be installed to increase the output.

The damage from the recent fire at the Rands Iron Works, Vancouver, B. C., was confined to the warehouse and pattern shops. Repairs will be made at once.

Government Purchases

WASHINGTON, D. C., February 15, 1915.

Sealed proposals will be received at the office of the U. S. Engineer Corps, 602 Burke Building, Seattle, Wash., until noon March 15, for a pumping plant for the Lake Washington canal locks.

The time for the opening of bids for the proposed 150-ton floating revolving crane for the Norfolk navy yard, specification 2092, has been postponed until 11 a. m., February 27. William M. Smith is acting chief of the Bureau of Yards and Docks.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, March 9, schedule 7934, one 50-hp. induction motor for Washington; until March 16, schedule 7944, one machine for grinding countersinks for Brooklyn; until March 30, schedule 7929, two electric traveling hoists; schedule 7931, two feed water heaters; schedule 7932, four steam turbine driven blowers, all for Mare Island; schedule 7933, two duplex boiler feed pumps for Puget Sound.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, February 9, for supplies for the navy yards, as follows:

Schedule 7825, Navigation

Class 61, Annapolis—One turbine pump. Bid 3, $1126; 4, $636; 20, $955; 53, $965; 59, $1100; 67, $961 and $1077; 92, $1050 and $1095; 120, $1207 and $1107; 126 $885; 136, $1075 and $913.75; 54, $890; 180, $1516; 210, $850, $905 and $1000.

Schedule 7826, Ordnance

Class 71, Washington—One motor-driven combined vertical and horizontal spindle milling machine—Bid 19, $4439.

Schedule 7827, Construction and Repair

Class 81, Norfolk—One plate-planing machine—Bid 17, $11,210; 141, $8500; 178, $7635 and $5310.

Schedule 7841, Construction and Repair

Class 112, Norfolk—One toggle press—Bid 17, $14,056; 69, $13,300 and $15,280; 173, $11,340; 194, $10,177.38, $13,909, $8570.28, $7443.32, $16,282.25, $17,289.73 and $14,185.13.

Alternate A—Same, on bidder's standard size of press that conforms most nearly to the specifications—No bids.

Alternate B—Same, bidder's next larger standard size press—No bids.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

3, Aumen Machinery Company; 4, Alberger Pump & Condenser Company; 17, Bethlehem Steel Company; 19, Beaman & Smith Company; 20, Blackall & Baldwin Company; 53, D'Olier Centrifugal Pump & Machine Company; 54, Eugene Dietzgen Company; 59, De Laval Steam Turbine Company; 67, Fairbanks, Morse & Co.; 69, Ferracute Machine Company; 92, Kemp Machinery Company; 118, Saul Magner; 120, Manistee Iron Works Company; 126, L. R. Merritt & Co.; 136, National Electrical Supply Company; 141, Niles-Bement-Pond Company; 173, D. H. Stoll Company; 178, William Sellers & Co., Inc.; 194, Toledo Machine Tool Company; 210, Henry R. Worthington.

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